NAVAL POSTGRADUATE SCHOOL
Monterey, California

THESIS

<div>

KNOWLEDGE MANAGEMENT INNOVATION OF THE USCG COUNTERNARCOTICS DEPLOYMENT PROCESS

by

James P. Espino

September 2000

Thesis Advisor:	Mark E. Nissen
Second Reader:	Kishore C. Sengupta

</div>

Approved for public release; distribution is unlimited.

DTIC QUALITY INSPECTED 4

REPORT DOCUMENTATION PAGE			*Form Approved* *OMB No. 0704-0188*

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.

1. AGENCY USE ONLY *(Leave blank)*	2. REPORT DATE September 2000	3. REPORT TYPE AND DATES COVERED Master's Thesis	
4. TITLE AND SUBTITLE: Knowledge Management Innovation of the USCG CN Deployment Process		5. FUNDING NUMBERS	
6. AUTHOR(S) James P. Espino, Lieutenant, United States Coast Guard			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000		. PERFORMING ORGANIZATION EPORT NUMBER	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A		10. SPONSORING / MONITORING AGENCY REPORT NUMBER	

11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.

12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.	12b. DISTRIBUTION CODE

13. ABSTRACT *(maximum 200 words)*

The major contribution this thesis provides is the application of a "break through" knowledge management system design methodology to a knowledge intensive military work process. Specifically, the methodology was used to develop a knowledge management system (KMS) for the United States Coast Guard (USCG) Pacific Area Tactical Law Enforcement Team (PACAREA TACLET). The focus was on applying knowledge management innovation using the above mentioned methodology to the Law Enforcement Detachment (LEDET) Counternarcotic (CN) Deployment Process, which depends on the combined experience and expertise of all members of the detachment in order for the process to be completed successfully. This thesis provides evidence that this methodology, which was developed by Nissen, Sengupta, and Kamel, is robust enough to be used in civilian knowledge work processes, as well as military environments.

The knowledge management system design process used acknowledges that the knowledge transfer required for the primary process to succeed is dependent upon other processes that do not directly relate to it. These processes are referred to as vertical-flow processes. Knowledge management innovation of the CN Deployment process is focused on the vertical-flow processes because the knowledge required for a LEDET to meet the horizontal process goal is dependent on the efficiency of the identified vertical-flow processes

First, an analysis of the horizontal process is conducted. Next, a knowledge analysis is performed, resulting in identifying the horizontal process goal and critical success factors. The CSFs are then used to determine the knowledge required for each node in the horizontal process. Third, this leads to the identification of the vertical-flow processes. Lastly, a context analysis is conducted iteratively with the knowledge analysis to determine what knowledge is required given a certain situation.

14. SUBJECT TERMS Coast Guard, Tactical Law Enforcement Team, Law Enforcement Detachment, Maritime Law Enforcement, Knowledge Management, Information Technology, Counternarcotics			15. NUMBER OF PAGES 154
			16. PRICE CODE
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT UL

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. 239-18

i

THIS PAGE INTENTIONALLY LEFT BLANK

KNOWLEDGE MANAGEMENT INNOVATION OF THE USCG COUNTERNARCOTICS DEPLOYMENT PROCESS

James P. Espino
Lieutenant, United States Coast Guard
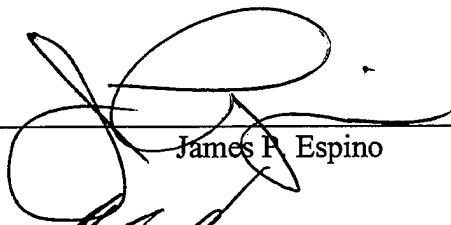B.S., United States Coast Guard Academy, 1994

Submitted in partial fulfillment of the
requirements for the degree of
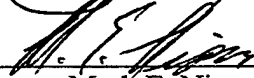
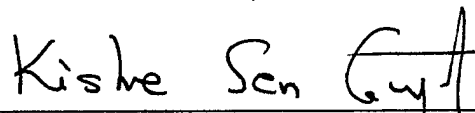## MASTER OF SCIENCE IN INFORMATION TECHNOLOGY MANAGEMENT

from the

NAVAL POSTGRADUATE SCHOOL
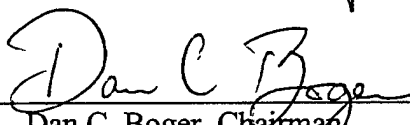**September 2000**

Author: _____
James P. Espino

Approved by: _____
Mark E. Nissen, Thesis Advisor

_____
Kishore C. Sengupta, Second Reader

_____
Dan C. Boger, Chairman
Information Systems Academic Group

THIS PAGE INTENTIONALLY LEFT BLANK

ABSTRACT

The major contribution this thesis provides is the application of a "break through" knowledge management system design methodology to a knowledge intensive military work process. Specifically, the methodology was used to develop a knowledge management system (KMS) for the United States Coast Guard (USCG) Pacific Area Tactical Law Enforcement Team (PACAREA TACLET). The focus was on applying knowledge management innovation using the above mentioned methodology to the Law Enforcement Detachment (LEDET) Counternarcotic (CN) Deployment Process, which depends on the combined experience and expertise of all members of the detachment in order for the process to be completed successfully. This thesis provides evidence that this methodology, which was developed by Nissen, Sengupta, and Kamel, is robust enough to be used in civilian knowledge work processes, as well as military environments.

The knowledge management system design process used acknowledges that the knowledge transfer required for the primary process to succeed is dependent upon other processes that do not directly relate to it. These processes are referred to as vertical-flow processes. Knowledge management innovation of the CN Deployment process is focused on the vertical-flow processes because the knowledge required for a LEDET to meet the horizontal process goal is dependent on the efficiency of the identified vertical-flow processes

First, an analysis of the horizontal process is conducted. Next, a knowledge analysis is performed, resulting in identifying the horizontal process goal and critical success factors. The CSFs are then used to determine the knowledge required for each node in the horizontal process. Third, this leads to the identification of the vertical-flow processes. Lastly, a context analysis is conducted iteratively with the knowledge analysis to determine what knowledge is required given a certain situation.

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF FIGURES

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF TABLES

THIS PAGE INTENTIONALLY LEFT BLANK

ACKNOWLEDGMENTS

THIS PAGE INTENTIONALLY LEFT BLANK

I.   INTRODUCTION

A.   OVERVIEW AND HISTORY OF THE UNITED STATES COAST GUARD

The United States Coast Guard is the oldest maritime service and the fifth branch of the armed services. It is a multimissioned maritime service that has responsibilities in five areas as outlined in the Coast Guard's 1999 Strategic Plan. These areas and their descriptions are printed below:

- *Maritime Safety* – Eliminate deaths, injuries, and property damaged associated with maritime transportation, fishing, and recreational boating
- *Maritime Security* – Protect our maritime borders by halting the flow of illegal drugs, migrants, & contraband; protecting illegal excursion of our Exclusive Economic Zone; and suppressing violations of federal law in the maritime region
- *Protection of Natural Resources* – Eliminate environmental damage and natural source degradation associated with all maritime activities
- *Maritime Mobility* – Facilitate maritime commerce and eliminate interruptions and impediments to the economical movement of goods & people, while maximizing recreational access to and enjoyment of the water
- *National Defense* – Defend the nation as one of the five U. S. Armed Services. Enhance regional stability in support of the National Security Strategy, utilizing our unique and relevant maritime capabilities

The history of the Coast Guard is rich and fascinating because the Coast Guard is actually a merger of five separate and independent federal agencies that performed many overlapping responsibilities. These agencies were the Revenue Cutter Service, the Lighthouse Service, the Steamboat Inspection Service, the Bureau of Navigation, and the Lifesaving Service. The United States Coast Guard was officially born in January 1915 when President Woodrow Wilson signed legislation that combined the above agencies into one organization as part of the Department of the Treasury.

In 1789, the United States had a new government and was in dire need of money. The most beneficial way of obtaining income was through trade revenue and implementing tariffs. Alexander Hamilton, who was the Secretary of the Treasury, urged the first congress to create the Revenue Cutter Service (a.k.a the Revenue Marine) to enforce tariff laws. At the time, tariffs were very controversial since the War of Independence was fought heavily based on the colonies having to pay taxes. However, in 1790, Alexander Hamilton received permission by Congress to create a fleet consisting of ten cutters. Thus began the Coast Guard's law enforcement responsibilities.

Another Coast Guard mission, which has its roots dating back to the first congress and the creation of the Lighthouse Service, is the responsibility of providing aids to navigation. This initially started with the federalization of lighthouses built by the colonies and went on to the building of other lighthouses and providing funding for other navigational aids such as beacons and buoys.

Military Readiness has always been a primary mission of the Coast Guard. The Coast Guard has fought in almost every war the United States has been involved in. In fact, from 1790 to 1798, when the U. S. Navy was created, the Revenue Cutter Service was the Nation's only maritime service. The Coast Guard historically has had two primary wartime roles. The first role is to augment the Navy upon orders by the President, and secondly, to perform special duties that its peacetime missions have uniquely prepared it for.

Search and Rescue is a mission that the Coast Guard is most famous for. The Coast Guard saying, "You have to go out, but you don't have to come back!" originates

from the Life Saving Service and stems from the responsibility its members had to make every effort to save lives from the perils of the sea without concern for their own.

Environmental Protection and Boating Safety are other responsibilities that the Coast Guard has. Like the previously mentioned missions, they have their roots in organizations that combined to make the Coast Guard in 1915.

B.   LAW ENFORCEMENT DETACHMENT (LEDET) HISTORY

The Coast Guard is divided into two Areas, the Pacific Area (PACAREA) and the Atlantic Area (LANTAREA). Each Area is divided into *districts* and each district is divided into *groups*. A district's area of responsibility (AOR) normally spans several states and a group consists of air stations, small boat stations, patrol boats and other units located in the same general area such as a city. In 1982, the United States Coast Guard (USCG) established the Law Enforcement Detachment (LEDET) program to provide units within the district or group with assistance in law enforcement matters. These matters included providing assistance with law enforcement operations and conducting law enforcement training for units within the district/group. Originally, LEDETs were under the operational control of the district and group they were geographically located in **(Figure 1.1)**.

In 1986, the LEDET program's mission expanded when Congress stepped up the "War on Drugs" by passing Public Law (P. L.) 99-570 which authorized the Coast Guard to establish personnel billets designated solely to conduct drug interdiction operations from naval surface assets that belonged to the Department of Defense (DoD). LEDETs were tasked to deploy aboard U. S. Navy "ships of opportunity" to investigate vessels of

COAST GUARD
COMMANDANT

PACIFIC AREA
COMMANDER

ATLANTIC AREA
COMMANDER

DISTRICT
COMMANDER

DISTRICT
COMMANDER

GROUP
COMMANDER

GROUP
COMMANDER
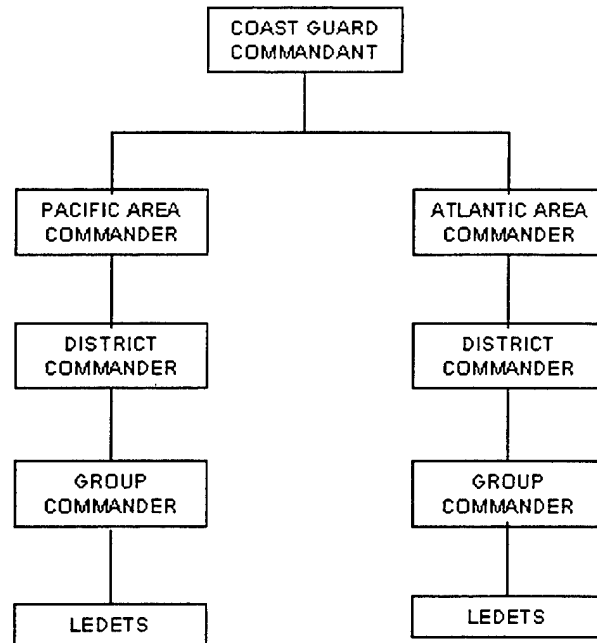
LEDETS

LEDETS

Figure 1.1 – LEDET Organization (1983)

interests and conduct Coast Guard boardings aboard vessels transiting or operating in areas frequently used by illegal drug traffickers. This provision was required because of *Posse Comitatus*. Posse Comitatus is, in essence, a law that prohibits the military from acting as a law enforcement agency. Posse Comitatus does not apply to the Coast Guard because, despite being fifth branch of the military (based on United States Code (USC) Title 10), by definition the Coast Guard is a law enforcement agency under the Department of Transportation and receives its law enforcement authority from USC Title 14, Section 89. In 1988, P. L. 100-456 made it a requirement that USCG law enforcement personnel be assigned to any USN surface vessel that transits a drug interdiction area (TACLETs).

The 1989, the counternarcotics (CN) role of the Coast Guard and the DoD was specifically described in the National Defense Authorization Act. The National Defense

Authorization Act gave the DoD the responsibility of being the lead agency for "the *detection and monitoring* of aerial and maritime trafficking of illegal drugs into the United States or any of its Commonwealths, Territories, or Possessions" (TACLETs). Likewise, the Coast Guard was designated the lead agency for the *interdiction and apprehension* of illegal drug traffickers on the high seas. DoD deploys surface assets to drug interdiction areas with LEDETs on board to meet these statutory responsibilities.

In 1993, the USCG restructured the LEDET program by creating four regional Tactical Law Enforcement Teams (TACLETs) under the direct control of the Area Commander (one in Pacific Area and three in Atlantic Area) vice the district commander. The TACLETs became responsible for standardizing the LEDETs' operational and administrative procedures. This includes coordinating and scheduling LEDET deployments with the Navy and ensuring that the LEDETs met the Commandant's training and qualification standards **(Figure 1.2)**.
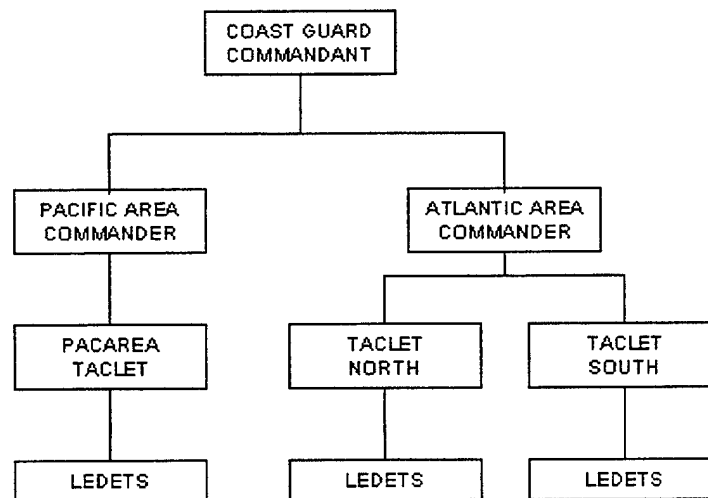
Figure 1.2 – TACLET Organization (1993)

In 1998, the LEDET program was restructured again in order to better meet the operational demands delegated to the LEDETs. These demands included an increased presence in narcotic transshipment areas, conducting interagency operations around the world, providing maritime interception operations support to Allied forces in the Middle East and, up until recently, in the Mediterranean, and supporting other Allied/coalition operations such as operations conducted in Haiti. This resulted in decommissioning one of the Atlantic Area TACLETs and distributing the personnel assigned to its LEDETs evenly across the remaining three TACLETs **(Figure 1.3)**.

```
                    ┌─────────────────┐
                    │  COAST GUARD    │
                    │  COMMANDANT     │
                    └─────────────────┘
                             │
            ┌────────────────┴────────────────┐
   ┌─────────────────┐              ┌─────────────────┐
   │  PACIFIC AREA   │              │  ATLANTIC AREA  │
   │  COMMANDER      │              │  COMMANDER      │
   └─────────────────┘              └─────────────────┘
            │                      ┌──────┴──────┐
   ┌─────────────────┐    ┌─────────────┐  ┌─────────────┐
   │  PACAREA        │    │  TACLET     │  │  TACLET     │
   │  TACLET         │    │  NORTH      │  │  SOUTH      │
   └─────────────────┘    └─────────────┘  └─────────────┘
            │                    │                │
   ┌─────────────────┐    ┌─────────────┐  ┌─────────────┐
   │    LEDETS       │    │   LEDETS    │  │   LEDETS    │
   └─────────────────┘    └─────────────┘  └─────────────┘
```
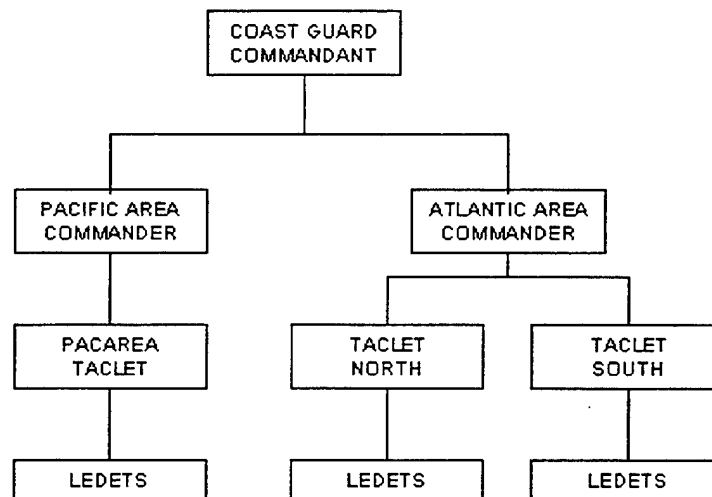
Figure 1.3 – TACLET Organization (1998)

Today, the primary TACLET mission is to deploy LEDETs aboard USN and allied vessels designated to support counternarcotic (CN) operations. Other missions LEDETs are responsible for are the following (TACLETs):

- Augment/train USN and allied "Visit, Board, Search, and Seizure" (VBSS) teams involved in international Maritime Interception Operations (MIO) in support of U.S. national security policy.
- Participate in interagency law enforcement operations with federal, state, and local law enforcement authorities.

6

- Deploy worldwide in support of port security and maritime counter-terrorist missions.
- Provide law enforcement training to USCG, federal, state, and local law enforcement units.
- Serve as technical observers (flight) for USCG, USN, allied forces, and other law enforcement agencies.
- Conduct law enforcement briefings for USCG, USN, and allied units.
- Augment/train other USCG unit boarding teams during CN, alien migration interdiction, or special operations.

C. THE RATIONALE FOR KNOWLEDGE MANAGEMENT

In recent years the prevailing innovation in organizational management is the discipline of knowledge management. The last decade has spawned numerous books, articles, and consulting agencies specializing in knowledge innovation. Businesses are using knowledge management as a tool to gain a competitive advantage over their competition and segments of the federal government, such as the Navy, are investigating how knowledge management can benefit the organization. All of this adds up to what Davenport and Prusak refer to as the "knowledge boom" (1998). Oxbow and Abell of describe it best by saying, "The ultimate corporate resource has become information-- the ultimate competitive advantage is the ability to use it-- the sum of the two is knowledge management" (1998).

Knowledge management is a discipline that has been created and widely studied in recent years as a response by organizations to find ways to gain a competitive advantage over rival organizations. The corporate world realizes that the cliché "knowledge is power" holds true in today's market place and is experimenting with innovative ways to make knowledge accessible throughout the organization. Information technology (IT) is used as an enabler to implement knowledge management innovations

throughout an organization regardless of geographic separation. For example, British Petroleum uses video teleconferencing (VTC) as a way for its knowledge workers who are continents apart to transfer knowledge through conversation and the exchange of ideas.

Managing knowledge is touted as being the most significant endeavor a company can pursue today, because organizations are becoming increasingly aware that the knowledge that resides within people is the single most important asset in the organization. Experts have noted several factors that contribute to this new concern of knowledge being an asset, however, the most noted reason is the increased globalization of the world's markets. The disappearance of tariffs, the creation of economic alliances such as European Union and NAFTA, and the phenomenal growth of the Internet have created a world with almost no economic boundaries. Huang states that in order for a company to be competitive, it must excel in four "change drivers" (1998). These drivers are *innovation*, *responsiveness*, *productivity*, and *competency*. The goal is to manage knowledge as a strategic asset and thereby allow an organization to maximize its potential in these four areas by being able to "learn, collaborate, and innovate" faster than the competition.

Hirotaka Takeuchi cites several other reasons for the importance of understanding and implementing knowledge management (1998). These are:

- A shift to knowledge as a basic resource
- A shift to knowledge-based industries
- A shift to growth as the top managerial priority

He quotes from Peter Drucker saying that, "knowledge is *the* resource not just *a* resource" (qtd. in Takeuchi 193). This is supported by the fact that knowledge workers

now constitute approximately "35% to 40% of the workforce" (Takeuchi 1998). This translates to knowledge workers owning both the means of production and the tools of production.

The shift to knowledge-based industries further requires companies to effectively manage knowledge. Drucker states that in the last forty years industries that produce and distribute knowledge and information instead of producing and distributing "things" now dominate the economy. He uses the pharmaceutical industry as an example. The product of the pharmaceutical industry is knowledge because pill and prescription ointment are essentially the industry's packaged knowledge. Information distributors include software companies and the entertainment industry.

The trend in the early part of the nineties was for organizations, both in the corporate world and the government, to cut cost and "right-size" (e.g., reduce in size) to become leaner and more efficient. However, a major lesson is being learned from these earlier practices. Organizations lost key knowledge workers by cutting labor costs at the professional and middle management levels. Organizations did not seem to realize that these personnel possessed a high level of corporate knowledge, and they acted as a medium for knowledge to be created and transferred. For instance, middle managers are the connection between top management's vision and how the frontline workers achieve the vision (Takeuchi 1998). These people took their experience and knowledge with them when they left the organization causing the organization to have corporate amnesia. Consequently, essential work could not be done when these knowledge workers left because no one else knew how to do their job.

D. THE CASE FOR INNOVATING THE LEDET PROGRAM THROUGH KNOWLEDGE MANAGEMENT

The Coast Guard, like many corporate and government organizations, is realizing that its most important assets are the people within the organization *and* the knowledge that these people hold. The Coast Guard's challenge is to develop a system to manage this knowledge for reuse in the future despite the fact that these knowledge workers will leave the organization or transfer to different geographic and/or organizational parts of the Coast Guard. This capability is especially important in today's environment where "voids" of knowledge are being created due to the fact that many people are leaving the military to pursue civilian opportunities.

The LEDET program is especially suited for applying knowledge management innovation, because the large amount of tacit knowledge required for a LEDET to successfully perform counternarcotics (CN) operations varies greatly, both over time and across diverse Coast Guard organizations. Although the training program provided to LEDETs is adequate in giving a person the background required to conduct lawful boardings in accordance with standard Coast Guard boarding procedures (e.g., guidance on looking for the basic indicators a vessel will have if drugs are on board), substantial experience at sea and on-the-job training (OJT) is required to develop CN expertise. For example, the relative level of experience possessed by individual LEDET personnel is partly responsible for disparities in the level of performance when comparing one LEDET to another. Key experience-based skills include the ability to identify indicators of a vessel smuggling narcotics and the ability to locate hidden compartments based on these indicators. Furthermore, the Coast Guard transfers personnel every year. LEDETs

suffer from losing experienced personnel due to the annual transfer season. Along with losing personnel, the knowledge they gained during their tour is also lost.

Using knowledge management to innovate the different processes LEDETs use to perform their mission seeks to ensure a continuous level of knowledge from one LEDET to the next, from one transfer season to the next, and from one deployment to the next. At a minimum, this innovation may assist in compressing the time it takes for a LEDET to reach and maintain a minimum standard of expertise and knowledge when losing personnel (knowledge workers). Even better, we strive to reach a state at which there will be homogeneous levels of performance across LEDETs and a seamless transition in the capabilities of LEDET through time.

This thesis discusses using knowledge management to innovate the U. S. Coast Guard Law Enforcement Detachment deployment process. It describes the knowledge analysis conducted on key tasks believed to greatly impact the outcome of the deployment process and discusses the design of a system that can systematically augment knowledge transfer within LEDETs at Pacific Area Tactical Law Enforcement Team. The system design includes a discussion of the "vertical processes," which are the processes involved in transferring knowledge from LEDET to LEDET, and how information technology (IT) can be leveraged to assist in the transfer. Here, the word "system" is used broadly to describe not only the IT infrastructure, but more importantly, it includes the processes and the people involved with the LEDET deployment process.

11

E.   RESEARCH QUESTIONS

The primary research question is: "How can the Pacific Area Tactical Law Enforcement Team LEDET Counter-narcotic deployment process be innovated through knowledge management?" The subsidiary research questions are:

- What is knowledge management?
- How does the current deployment process perform?
- What steps should the Coast Guard take to implement knowledge management based innovation?
- What technologies are available to support implementation of a knowledge management system at PACAREA TACLET?

F.   SCOPE OF THE THESIS

The scope of this research includes a focus on what knowledge is required to successfully complete a CN deployment operation, how this knowledge is acquired, and how is this knowledge transferred to other LEDETs and individuals within PACAREA TACLET.   It also explores how IT can be implemented to support the knowledge management life cycle. But the study is limited in scope to the Coast Guard PACAREA LEDET mission, and it emphasizes the CN law enforcement activities.

G.   METHODOLOGY

The methodology used in this thesis research consists of the following steps:

- Analyze the counternarcotic deployment process that a LEDET conducts by reviewing TACLET Standard Operating Procedures (SOP), interviewing key personnel such as PACAREA TACLET's Commanding Officer, Executive Officer, and Officers in Charge of available LEDETs; review recent After Action Reports (AARs) and trip reports.

- Following an integrated methodology for knowledge process systems design, determine critical success factors (CSFs) required for successful CN performance boarding by the methods mentioned above (paragraph 1). Analyze how knowledge is acquired, organized, and distributed to other LEDETs by reviewing the processes used to transfer knowledge between

12

LEDETs (e.g., qualification process, AAR process, IT support). Steps 1 and 2 in the methodology provide an "as is" view of the current LEDET deployment process.

- Determine what knowledge management innovations may improve knowledge transfer by analyzing what knowledge is required to achieve the CSFs and determining how the knowledge is currently acquired and determining better and more methodical processes to transfer knowledge, both tacit and explicit.

- Determine what IT infrastructure can support knowledge transfer by identifying possible improvements to how knowledge is currently transferred.

- Develop an implementation plan based on the above methodology.

H.   THESIS ORGANIZATION

The thesis is organized as follows. Chapter II follows the introduction and gives an overview of knowledge management and PACAREA TACLET/LEDETs. Chapter III outlines the current deployment process and the current knowledge process. Chapter IV contains the TACLET/LEDET Knowledge Management Design. Chapter V follows with conclusions and recommendations.

THIS PAGE INTENTIONALLY LEFT BLANK

II. KNOWLEDGE MANAGEMENT

A. WORKING DEFINITION OF KNOWLEDGE

It is important to properly define knowledge and how it differs from *and* relates to information and data before designing a knowledge management system. Organizations have spent enormous amounts of money and other resources on technology initiatives that have not delivered the expected returns because of their failure to understand what knowledge is (Davenport and Prusak 1998). These organizations failed to properly conduct an analysis that will allow them to implement an information technology (IT) infrastructure that would help their organization achieve its goals. An organization's success often depends on knowing the difference between data, information, and knowledge as well as knowing which of the three "you need, which you have, and what you can and can't do with each" (Davenport and Prusak 1998).

Data is the lowest level of known facts without context and are discrete and objective. Organizations normally collect data via a structured record of transactions. For example, when buying a book online, the company will record the transaction and store it in a database. The transaction may include information such as the price of the book, shipping cost, name and ISDN of the book, and what type of book it is. The company can do this with every transaction and will eventually have a large amount of data that they can draw trends from.

Information is described as "data that makes a difference" by Davenport and Prusak (1998), and Brooking refers to information as "organized data presented in context" (1999). The sender of the data must provide the receiver with meaning in order

for it to become information. It is delivered from a sender to a receiver in some form, such as a document, and has the affect of shaping the receiver's perception of the world. Devlin provides an equation to illustrate this point (1999):

$$Information = Data + Meaning$$

Conceptually, Devlin states that information flows more readily within the organization or to other organizations because it is more manageable and less complex than knowledge (1999). He supports his claim by saying that information exists "at the level of society" while knowledge "exists in the individual minds of people." Davenport and Prusak agree by contending, "Knowledge exists within people, part and parcel of human complexity and unpredictability" (1999).

Knowledge is a combination of what information a person receives, their previous experiences, and the context those experiences were received in (Harris 1996). Context is determined by several factors that include what situation the person is in, the person's moral beliefs and ideals, and his or her heritage (Takeuchi 1998; Harris 1996). Harris defines experience as being "previously acquired knowledge" (1996). Experience and context are what make knowledge workers invaluable assets to an organization because they are impossible to duplicate. The knowledge that knowledge workers provide, given a particular mix of people and the synergy created by their group dynamics, is what can give an organization a comparative advantage over competitors.

When knowledge is transferred from one person to the next, or from one organization to the next, knowledge is created, or drawn, and interpreted based on the receiver's experience *and* context. Harris states that, "if the receiver does not have the

16

appropriate background for interpreting the new knowledge" then it is useless because the knowledge will not be interpreted correctly (qtd. in Harris 1996). Again, Devlin provides an equation to summarize what is stated above (1999):

Knowledge = Internalized information + Ability to utilize the information

B.   DIMENSIONS OF KNOWLEDGE

Researchers have classified knowledge into two categories, explicit and tacit. Explicit knowledge can be easily written and transferred via documents, manuals, mathematical formulas, databases, and like tangible media. Technology is to the point where explicit knowledge is easily accessible and transferable via many different technical instruments such as the Internet, an organizational intranet, video teleconferencing (VTC), database management systems, and others.

Tacit knowledge is more difficult to transfer, because it is difficult to formalize and almost impossible to codify in a form that can be transferred over the same media used for explicit knowledge is (Zack 1999; Borghoff & Pareschi 1997). The reason for this is, tacit knowledge is "deeply rooted in an individual's action and experience, as well as in ideals, values or emotions" that the person embraces (Takeuchi 1998). Tacit knowledge includes intuition, hunches, and gut feelings, for instance.

Tacit knowledge has two dimensions, the "technical" dimension and the "cognitive" dimension (Nonaka and Takeuchi 1995). The technical dimension describes the knowledge a person can develop from years of experience performing a specific skill. This knowledge can be described as "know-how." Meaning, a person has the uncanny ability to perform a particular skill beyond that of an average person. For example, a

17

master mechanic who has ability to diagnose an automobile's problem more precisely than less experienced people despite being given the same symptoms and performing the same troubleshooting process.

The cognitive dimension consists of values, perceptions, mental models, beliefs, and other intangibles that a person has developed since childhood. Again, these intangibles shape how a person approaches different situations that life provides on a day-to-day basis. This dimension is very difficult to articulate.

KNOWLEDGE CONTINUUM
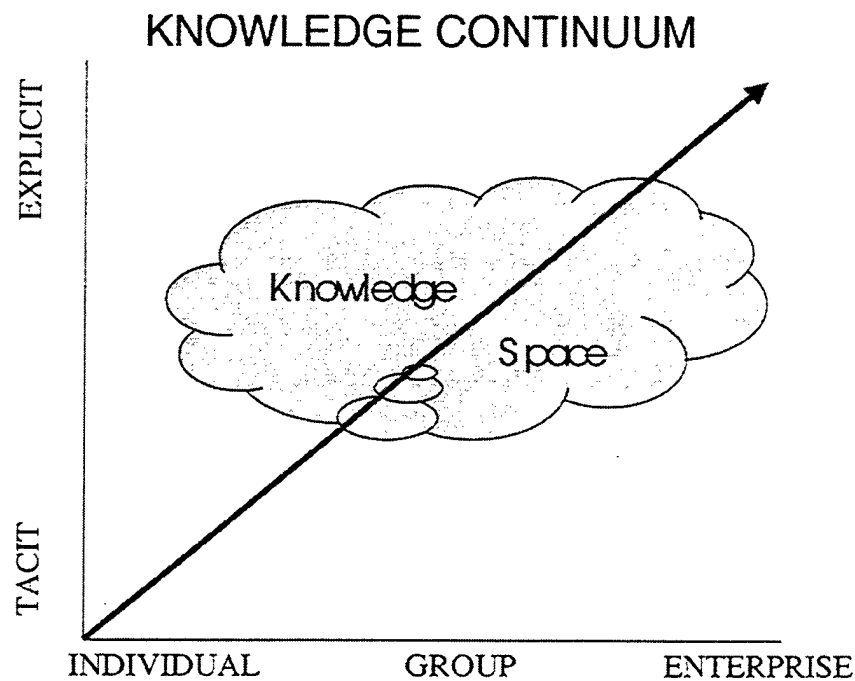
Figure 2.1 – Knowledge Continuum

Figure 2.1 represents the knowledge continuum and illustrates the type of knowledge present as you move along the different levels of an organization. Notice that knowledge at the individual level is mainly tacit and as you move up to the enterprise level knowledge is more explicit. Knowledge management aims to convert knowledge at

18

the individual level explicit and to distribute such knowledge across the enterprise **(Figure 2.2)** in order "to make the organization more productive, more effective, and more successful" (Srikantaiah and Koenig 2000).

KNOWLEDGE CONTINUUM
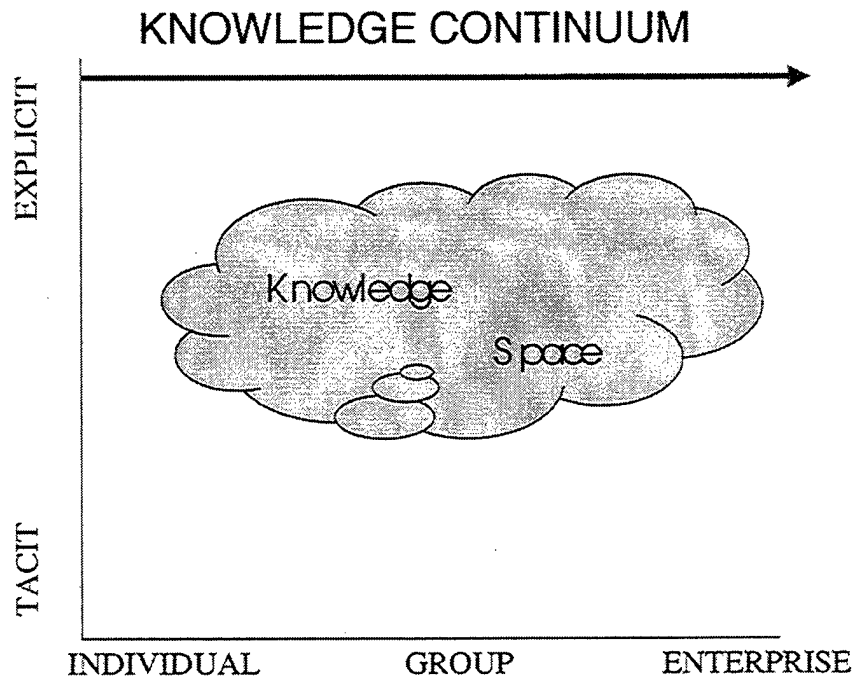
Figure 2.2 – Ideal Knowledge Continuum

The following chart **(Figure 2.3)** is taken from Brooking and identifies several ways to make tacit knowledge into explicit knowledge if it is possible (1999). For instance, we are all familiar with a teacher wishing to transfer tacit knowledge in the classroom, and various analysis performed by engineers are key to learning structural properties of designed systems. Further, the mentor-protégé relationships are at the center of many personnel development systems and repetition of tasks such as riding a bike or performing a golf swing develops tacit knowledge. Two or more of these methods can be applied simultaneously to provide a person with an experience that is rich in tacit knowledge transfer. A more difficult method of transformation involves writing

19

down the tacit knowledge a person possesses. The difficulty lies in a person not knowing what he or she knows. For example, in the bike-riding example mentioned above, it would be difficult to write down how a person rides a bike with enough detail for a person who cannot ride a bike to apply the knowledge.

TACIT   EXPLCIT

By Teaching
———————————————————————▶

By Analysis
———————————————————————▶

By Mentoring
———————————————————————▶

By Repetition
———————————————————————▶

Then by Writing it Down
———————————————————————▶
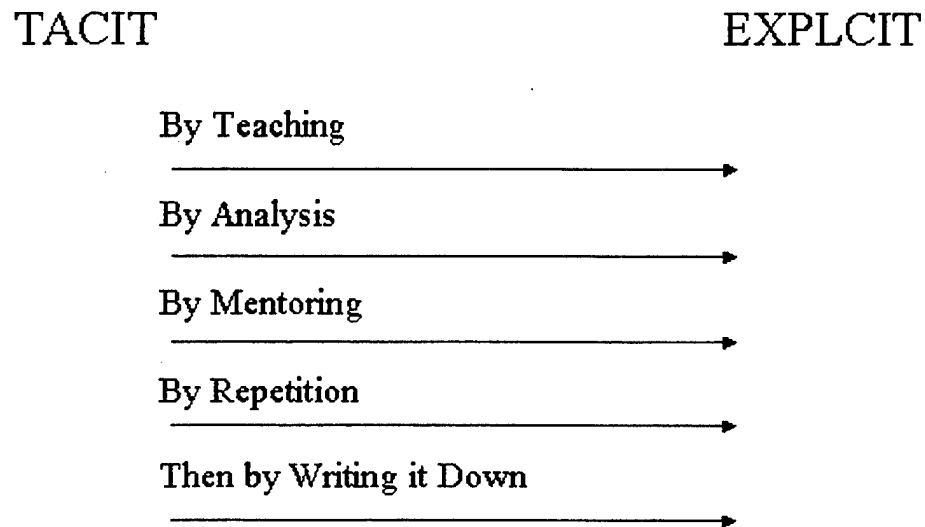
Figure 2.3 – Tacit to Explicit Knowledge Transformation

C.   KNOWLEDGE CREATION

Understanding how an organization creates knowledge is an important part of conducting a thorough analysis. According to Nonaka and Takeuchi (1995), knowledge creation is required for an organization to be innovative, and in turn, innovation is required for an organization to have a comparative advantage. How well or how poorly an organization creates knowledge can determine its effectiveness in reaching its goals. Knowledge creation consists of (1) obtaining or developing knowledge that is new to the organization and (2) having the capability to allow the knowledge to flow to people who can make use of the knowledge. It is important to note that knowledge is not created

unless allowed to flow to segments or people within the organization who can use it to support continuous innovation.

Knowledge can be obtained many different ways. Several are listed below:

- An organization can hire persons with specific knowledge
- Experience via OJT
- Mentoring programs
- Inter/intra-organizational conversations
- Training and education programs
- Research and development

An organization has the option of hiring a person with the required knowledge if the knowledge cannot be cultivated within an organization or if it is not economical to have a person working within the organization possessing the required knowledge. For example, a construction company may decide to hire electricians to wire a building instead of having their own electricians under its payroll. On-the-job-training provides a person with real life experiences that allows him/her to store for future use. However, OJT requires overhead with respect to providing a person with the time to gain experience and learn from his/her mistakes. This method is often used with a mentoring program in order to accelerate the learning process and lower the overhead. A good mentor will provide a person with quality feedback on how a person is performing a task, which in turn gives the person learning the task a mental file of his/her mistakes or triumphs. This mental file acts as a benchmark for how the task should be performed and completed in the future and provides experience for future reference.

Conversations provide a rich medium for obtaining knowledge whether they are casual conversations or "shop talk." The reason being is that conversations stimulate ideas through the interactions of two or more people. This is particularly true if a group

21

of people interact together on a frequent basis. An often cited example consists of people having "water cooler conversations" or conversations around the soda machine. These types of conversations present an open atmosphere to discuss issues and share experiences with little inhibitions.

Training and education programs allow an organization to provide its knowledge workers with knowledge that is focused on specific topics. A noteworthy example includes the Naval Postgraduate School (NPS). NPS provides the armed services with courses focused on specific topics (e.g., Defense System Economics, Information Systems Analysis and Design) that benefit the Department of Defense and their respective services. Furthermore, it provides an environment that promotes the exchange of ideas among personnel from a variety of backgrounds. Also, research and development programs allow for technologies that will assist the organization in achieving its goals.

Several ways that knowledge can flow within an organization also exists. These include the following:

- Formal/informal networks
- Documentation and other organizational manuals
- Presentations

Networking consists of people forming relationships with persons within or outside of the organization. Each person within the network possesses knowledge and, through these networks, that knowledge is shared with other people. A formal network may consist of an organization listing the job titles of people or categorizing a group of people based on their job function or expertise. This is also known as the organization's "yellow pages." An informal network consists of people who have relationships with

each other and share knowledge, but the network is not specifically created for the purpose of assisting the organization. These networks may consist of friends, business acquaintances, fraternity brothers, sorority sisters, and other types of business or social relationships. Informal networks may be more valuable due to the fact that these networks are normally based on how much each person in the network trusts the other people within the network. A feeling of trust between people tends to create a more open environment for sharing knowledge.

More formal media for transferring knowledge include manuals, documentation, and other organizational records. These media provide a warehouse for explicit knowledge possessed by the organization. Also, presentations allow knowledge transfer much like how a teacher transfers knowledge to students.

Technology, specifically information technology, is applied as a tool to facilitate knowledge creation. Current examples include groupware products such as Lotus Notes and Microsoft's Digital Dashboard. However, implementing these technologies does not mean an organization has implemented a knowledge management system. Brooking makes the point by saying an organization that implements these applications has "Lotus Notes users" and Digital Dashboard *users,* not necessarily knowledge workers (1999). It is said time and time again that technology is used to support knowledge management and knowledge creation.

D.   KNOWLEDGE MANAGEMENT

There are numerous definitions of knowledge management, but the following is a definition given by Gordon Petrash and is the most concise and descriptive definition to

date, "[Knowledge management is] getting the right knowledge to the right people at the right time so they can make the best decision" (qtd. in "Knowledge Management Systems"). In essence, knowledge management is the systematic handling of an organization's knowledge process, which includes the creation, organization, formalization, distribution, and application of knowledge in order to meet organizational goals (Nissen, Sengupta & Kamel 2000; "Knowledge Management Systems"; Firestone 1999; Corall 1999).

Sound knowledge management and designing an effective knowledge management system depend on assessing and possibly changing every aspect of the organization. This means conducting an analysis of the *processes* involved in achieving the organization's goals, identifying practices within the organization that inhibit or promote knowledge creation or transfer, and implementing technology to support knowledge management within the organization.

Business Process Re-engineering (BPR) techniques are used to determine whether or not an organization is conducting business in an efficient manner. An analysis of the organization's business processes and, if required, establishing processes that better achieve the required results is a cornerstone of ensuring that organizations are effective and efficient. However, processes that support the primary business processes must be analyzed, evaluated, and possibly re-engineered in order to ensure that a knowledge management system is correctly implemented. Primary business processes refer to the processes that directly contribute to the organization's achievement of a goal. Alternatively, supporting processes aid in knowledge transfer. These supporting processes are referred to as "vertical-flow" processes and discussed in more detail later.

24

Organizational culture is the second of three cornerstones that must be evaluated and possibly changed in order to implement an effective knowledge management system. This cornerstone focuses on the development of human capital. Liebowitz divides the categories organizations must develop or must benefit the organization into five categories. These categories are: *Training and Education, Skills, Outside Pressures & Environmental Impacts, Internal and Organizational Culture, and Psychological Impacts* (Liebowitz 1998). Table 2.1 provides several examples of each category. Introducing change in this arena is difficult because upper management support is critical for its success.

Training & Education	Skills	Outside Pressures & Environmental Impacts	Internal & Organizational Culture	Psychological Impacts
Formal Training	Research Skills	Industry Competition	R&D expenditures	Morale
Formal Education	Entre- & intra-preneural skills	Half-life of info in the industry	Formalized knowledge transfer systems	Creativity& Ingenuity
Mentoring & OJT	Retention Rates	Demand and Supply of those in the field	Informal knowledge transfer systems	Stimulation & Motivation

Table 2.1 – Human Capital Factors (Liebowitz 1998)

An organization must develop a sound system to develop personnel with the knowledge and skills required for the organization to meet its goals. This may include providing formal training programs or other types of advanced education and creating a culture that encourages developing important skills such as those listed in Table 2.1. Retention rates refer to how much a person can retain with regards to his/her experiences and how well they can apply what they have learned. Skills such at these encourage innovation and "out of the box" thinking and allows an organization to stay ahead of the competition.

Outside pressures and environmental impacts must be favorable towards an organization. Otherwise, areas that an organization can control, such as those listed under internal and organizational culture column, must be able to offset these pressures. This may include increasing the amount of money spent on training and education, R&D, knowledge systems, and intangible attributes such as morale and creativity.

The third element involves implementing information technology that will support knowledge creation within an organization. It is very possible to hinder knowledge transfer if the implementation of IT is not properly thought out. Proper IT implementation must include a thorough analysis of the process involved, the knowledge required, and the context. More on this will be discussed later, but, it is vital that organizations realize that IT is not knowledge management, although, it is a vehicle that allows it (Oxbow and Angela 1998).

E. KNOWLEDGE MANAGEMENT LIFE CYCLE

Figure 2.4 illustrates the life cycle model described by Nissen (2000). This model is an integration of several models described by other prominent knowledge management researchers. Nissen divides the activities into two categories. Category I represents activities that he calls "sharing" activities and Category II represents "non-sharing" activities (Nissen, Sengupta, & Kamel 2000). He further goes on to explain that Category I activities represent a majority of the focus with regards to current IT support, whereas Category II activities benefit much less from IT at present.
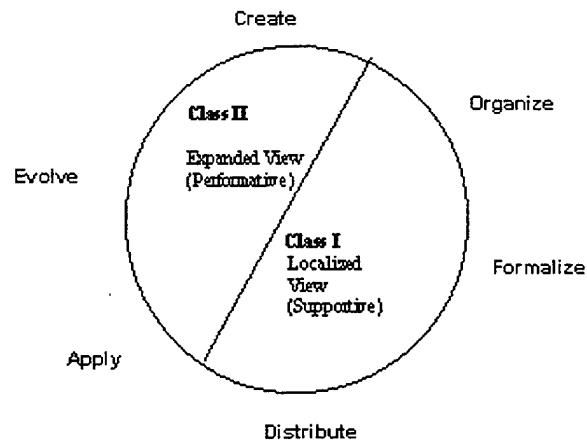
Figure 2.4 – Knowledge Management Life Cycle (Nissen, Sengupta, & Kamel 1999)

Create refers to an organization's method of knowledge creation. According to Nonaka and Takeuchi, the creation of knowledge is the single most important act an organization can do in order to maintain a competitive advantage over its competition (1995). However, very few systems have been developed to support knowledge creation. Notable examples include an organization's research and development (R&D) program, data mining systems, and bench marking (Nissen et al. 2000). There are few other technologies that support this at present

The act of storing and the techniques of retrieving knowledge describe what happens during the *organize* activity. Organizing knowledge requires a large amount of overhead because a staff must be dedicated to determining what knowledge is relevant, categorizing knowledge, and identifying what knowledge must be stored. Also, an organization must decide what forms of knowledge to store. For example, documents, manuals, presentations, videos of meetings, emails, video teleconferences, are all items to consider when organizing knowledge. The advent of applications such as key word

searches and knowledge maps all aid in readily distributing knowledge, however, there is no simple solution to conduct an organization of knowledge.

The final two Class I activities are *formalize* and *distribute*. Transforming knowledge into a form that facilitates easy distribution is carried out in the *formalize* activity and *distribute* is concerned with the distribution of knowledge throughout the organization. Notable examples of how these two activities were applied include the development of expert systems to perform highly specific tasks. For example, General Electric designed an expert system called CATS-1. CATS-1 was modeled after a human who was an expert in locomotive troubleshooting. This expert was observed and interviewed by knowledge engineers for several months. The purpose of the system was to assist novice locomotive engineers in diagnosing any problems that a locomotive may have without the need to have a more experienced engineer present.

Techniques being used to formalize and distribute knowledge today include web-based lessons learned, knowledge brokers, "yellow pages," manuals, memorandums, and other types are documents. Furthermore, the advent of the Internet and related technologies allow for knowledge to be formalized and distributed to a much greater audience, however, formalizing tacit knowledge is still very difficult and is an area that is ripe for research. Currently, distributing tacit knowledge through mentors and on-the-job training (OJT) is the only other method commonly used.

The use of knowledge to make a decision or make judgments occur in the *apply* activity and from there knowledge may *evolve*. Meaning the knowledge a person has is developed to a higher state based on new experiences and the acquisition of new

knowledge. As knowledge evolves it allows the person or organization that owns it to be more innovative. However, knowledge application requires that a person has the insight to understand how to properly apply the knowledge and that comes only from experience. The challenge is to provide an organization and its people with enough experiences to properly apply knowledge. The opportunity to have experiences that cultivates knowledge application allows for knowledge to evolve. Evolution goes on to provide a person when a larger knowledge base that will allow him/her to apply any knowledge gained in unfamiliar situations. For example, the knowledge a person gains from learning how to safely ride a bike on city streets may provide him/her with insight as to how to drive a car safely in city streets. An organization that develops ways for its personnel to evolve their current knowledge to a higher level will continue to be innovative and have a competitive advantage over its competitors.

F.   KNOWLEDGE MANAGEMENT SYSTEM DESIGN PROCESS

The knowledge management system design process used for this paper is depicted in Figure 2.5. Notice that process analysis, knowledge analysis, and the context analysis are iterative in nature. Further, the design and implementation of a KMS follows traditional system design methodologies such as the system design life cycle (SDLC) or more recent object oriented design (OOD) methodologies.
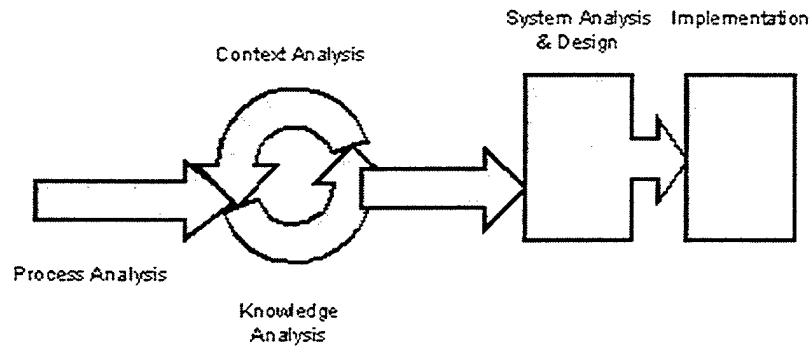
Figure 2.5 – Knowledge Management System Design

Process analysis begins by identifying what process will be innovated using knowledge management and continues with an analysis of the process to determine whether or not the process is effective and efficient in meeting the organization's goals. This is normally determined by identifying what are the key "business" processes for the organization. Key business processes are processes that normally assist the organization in achieving a specified outcome based on strategic goals, mission statements, or desires of senior management. The process to be innovated using knowledge management will be referred to as the "horizontal" process.

The analysis of the horizontal process involves conducting a redesign analysis commonly performed during business process reengineering (BPR). This involves determining if the horizontal process contains any pathologies and providing any remedies for any pathologies that are encountered. This paper represents the horizontal process graphically by having each task in the process represented by a node and connected to other tasks by edges that represent the flow of work through the process.

Figure 2.6 provides a generic example of the first three steps in developing a customized software application. The nodes are described by seven attributes associated

30

with it. These attributes are: 1) activity name, 2) role of the agent responsible for its performance, 3) the organization supporting the activity, 4) IT employed to support the activity, 5) IT employed to support communication, 6) IT employed to automate the activity, and 7) non-IT tools or techniques employed in the performance of the activity (Nissen et al 2000). The horizontal process is diagnosed using measurements obtained from the KOPeR system (Nissen 1998). The KOPeR system assists in identifying pathologies present in the horizontal process by providing a value for a series of configuration measurements. A redesign of the process may be conducted based on the values give for each measurement.

T:	Order S/W	T:	ID Req	T:	Design S/W
A:	Sales Rep	A:	Req Agent	A:	S/W Design
O:	Sales	O:	Req Dept.	O:	Design Dept
IT-S: nil		IT-S: Word Proc		IT-S: RAD	
IT-C: Phone		IT-C: E-mail		IT-C: E-mail	
IT-A: nil		IT-A: nil		IT-A: nil	
N-IT: nil		N-IT: In/Out Box		N-IT: pen & paper	
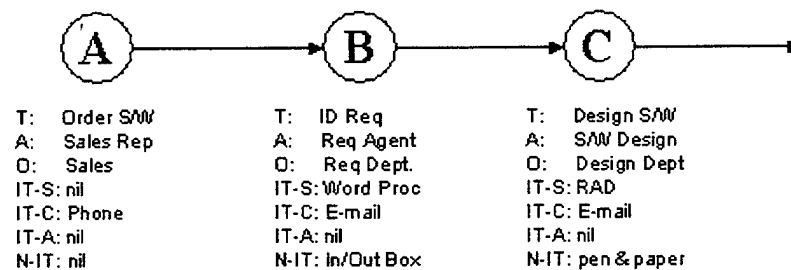
Figure 2.6 – Example of Horizontal Process Diagram

The knowledge analysis begins by determining exactly what the organization's goal is with respect to the key process. Identifying the goal is important because it plays an important role in determining what the critical success factors are which, in turn, helps to identify supporting processes that affect key horizontal processes in terms of consistency when performed across time or across different groups within the organization. These supporting processes are known as the "vertical flow" processes and are the focus of knowledge management innovation.

Secondly, CSFs of the chosen horizontal process are determined based on the organizational goal. CSFs are items, assets, or actions that must exist or occur in order for the process to be successful and for the goal to be met. Next, the knowledge required for the process to succeed is determined for each node in the process based on the CSFs. Brooking describes this knowledge as "critical knowledge" because the organization will not be able to meet the CSFs without it (1999).

Finally, the vertical-flow processes are determined based on the knowledge that is required to successfully meet the CSFs. The effectiveness of the vertical-flow processes in supporting the horizontal process determines whether or not the horizontal process can be conducted by different groups of people with a consistent level of success throughout an organization or at different periods of time (See Figure 2.7). Therefore, the vertical-flow processes must be analyzed and possibly redesigned in order for knowledge to be properly transferred throughout the organization and must be able to sustain knowledge at every activity of the KMLC. Again, the primary contribution of knowledge management innovation is to attempt to execute the horizontal process with a consistent level of expertise resulting in achieving the process goal regardless of when the horizontal process is performed or by whom.

Context analysis involves identifying what knowledge is being used and in which situations. Issues that relate to this include how explicit knowledge is codified and accessed, how well the organization codifies tacit knowledge, the structure of the organization, and mechanisms in place to promote knowledge transfer within the organization. The context analysis is critical to the design of the knowledge management system, because it aids in determining what technologies should be used, how they

should be used, whether or not the horizontal process and vertical-flow processes will be effective based on the situations in which the processes will be executed. It is clear to see
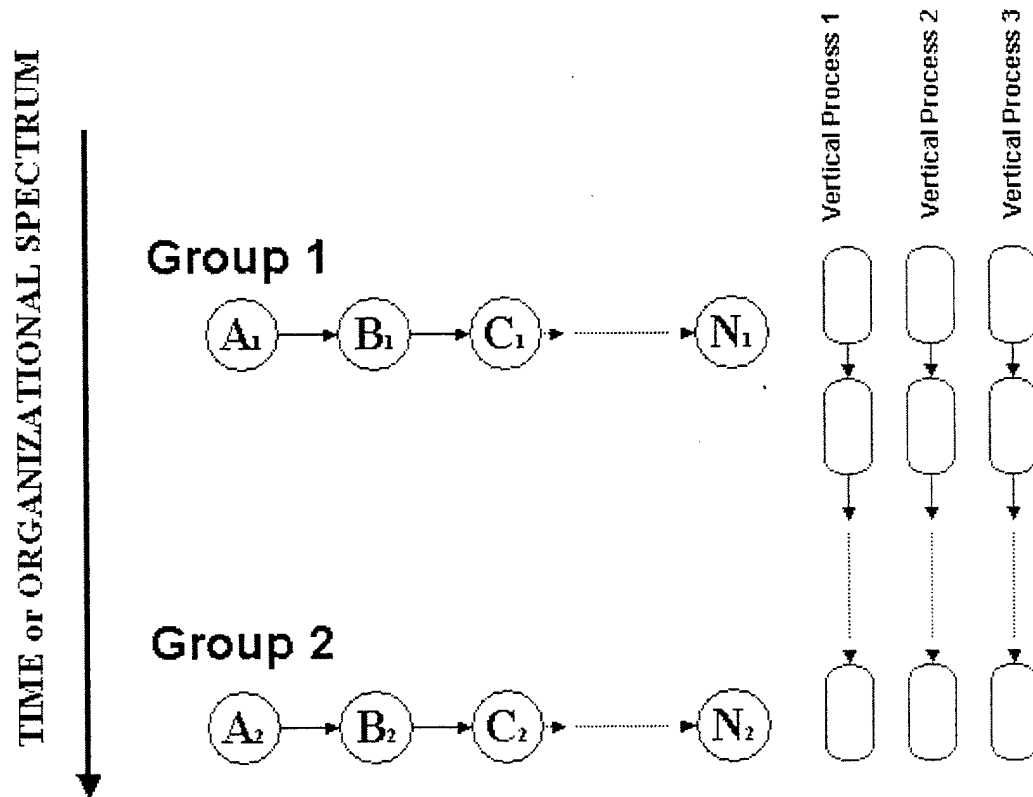
Figure 2.7 – Example of Vertical–flow Processes

why the first three steps of the KMS design process are iterative in nature. Discoveries or innovations in one will have a direct effect on one or both of the other steps. The outcome of the process analysis, knowledge analysis, and the context analysis tasks result in providing a large portion of the data and information required to implement a KMS.

System analysis and design and the implementation of the KMS use methodologies currently practiced by organizations today. Implementing a KMS that is effective is determined by how well the process analysis, knowledge analysis, and

contextual analyses are conducted. Once these three steps are completed, the system analysis and design as well as the implementation are no more difficult than for any information system. It is important to note that information technology is an enabler used to implement a knowledge management system. However, organizations must invest in IT prudently in order to take advantage of the benefits that can be provided. Supplemented by other enablers of change (e.g., organizational design, workflow modification), IT can be implemented to provide solutions for any pathology found when conducting the process analysis as well as for supporting the vertical-flow processes.

III. CURRENT PROCESS

A. PACIFIC AREA TACTICAL LAW ENFORCEMENT TEAM

The research conducted for this thesis focuses primarily on the Pacific Area Law Enforcement Team and its primary mission of deploying LEDETs aboard USN or allied vessels in order to support counternarcotics operations in the Eastern Pacific and the Caribbean. As mentioned earlier, PACAREA TACLET is one of three regional TACLETs and the only regional TACLET under the Pacific Area Commander's control. The Team is located in San Diego, Ca and its area of responsibility (AOR) spans from the western United States to Mexico, and as far west as the Middle East.

While research for this thesis was being conducted, PACAREA TACLET began undergoing a major change in its personnel make-up due to the addition of another counternarcotics mission. This resulted in a major reorganization within PACAREA TACLET and the addition of approximately forty new personnel to the unit. **Figure 3.1** depicts the current organization of PACAREA TACLET. The new mission consists of deploying a 17-person team aboard one of three Stalwart (AGOS) class ships, which have been specifically modified to conduct counter drug operations in the Eastern Pacific and the Caribbean. These vessels have a substantial electronics suite making them a highly capable detecting and monitoring platform. Furthermore, the ships have been modified so that they can deploy with specially designed deployable pursuit boats (DPBs) that will be maintained by TACLET personnel. DPBs are 39-feet long rigid-hull inflatable boats that can conduct a long-range patrol from the from the Stalwart class vessels at high speeds. The concept of the operation calls for a team to deploy onboard the these

35

Stalwart class vessels and use the their capabilities to identify and locate "go-fast" boats suspected of carrying illegal drugs.
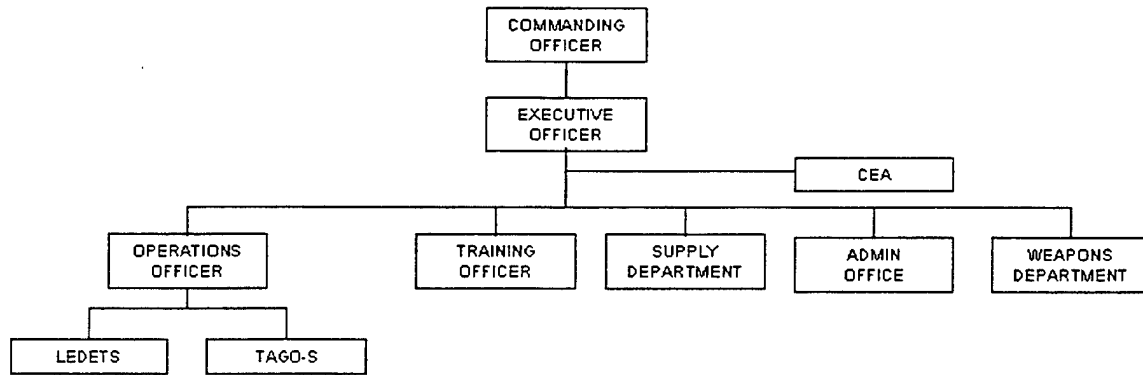
Figure 3.1 – PACAREA TACLET Organization

In order to meet this new responsibility, the Commandant of the Coast Guard authorized PACAREA TACLET to have an increase of approximately forty personnel assigned to the unit. Unfortunately, the majority of the new personnel being sent to PACAREA TACLET lack general Coast Guard experience as well as maritime law enforcement experience. This is a result of the Coast Guard having a shortage of personnel across the board and not having a sufficient pool of experienced maritime law enforcement professionals to draw from. The increased number of inexperienced personnel arriving in a short period of time has resulted in problems and represents a KM issue discussed in a later section.

B.   OVERVIEW OF KNOWLEDGE ANALYSIS APPROACH

The LEDET counternarcotics deployment process is identified to be the key business process to be analyzed and is depicted in **Figure 3.2. Figure 3.2** delineates the deployment process from assignment of a particular team to a deployment through the filing of an after action report (AAR) when a LEDET completes its mission. A node

represents each step in the process and the attributes to describe each task are provided in the corresponding section. An analysis of this process is conducted below to determine if pathologies exist based on data collected by applying the KOPeR system.
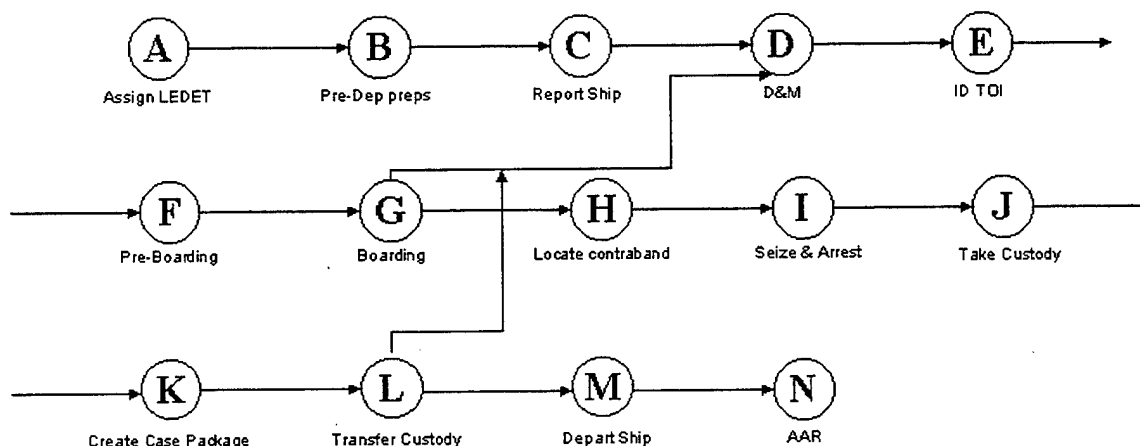
Figure 3.2 – LEDET Counternarcotic Deployment Process

Next, a knowledge analysis is conducted and begins with identifying the goal of the deployment process and the CSFs. The CSFs lead to determining what knowledge is required and how it is currently acquired. The results obtained from this step are used to identify the vertical-flow processes that are required to transfer knowledge within the TACLET organization.

Finally, a contextual analysis is conducted to determine how knowledge is used and in what types of situations. This analysis assists in determining how to design a system that allows the most effective use of technology to aid in knowledge transfer.

C. PROCESS DESCRIPTION

The LEDET counternarcotic deployment process **(Figure 3.2)** is the key business process being analyzed and is discussed in detail below.

1.   Assign LEDET to Deployment

This task consists of the Operations Officer assigning a LEDET to a particular CN deployment **(Table 3.1)**. The *Assign LEDET* task for the CN Deployment process is conducted concurrently with the *Assign LEDET* task of other key processes that represent other TACLET mission areas. As with the majority of the horizontal process, very little IT is used to complete this task. Electronic mail and the military message system are used as a primary means of communications.

Agent	Operations Officer
Organization	TACLET
Information Technology Support	-
Information Technology Communications	Email, message traffic, phone
Information Technology Automation	-
Non-Information Technology	Pen & paper

Table 3.1 – Assign LEDET to Deployment Attributes

The Operations Officer receives information regarding what operations are forthcoming from the Pacific Area Commander, the Navy, and the two Joint Interagency Task Forces (JIATFs). LEDET readiness and availability issues are addressed via staff meetings, readiness reports, formal or informal meetings with the Officers in Charge of each LEDET, and through deployment schedules that the operations officer creates him/herself. The Operations Officer schedules LEDETs to conduct these operations based on the inputs outlined above.

This scheduling process is done without the support of any type of IT. In fact, the process is carried out using the "pen and paper" method where the Operations Officer manually attempts to find the best combination of scheduled deployments and available LEDETs. An interview with the current Operations Officer revealed that an attempt to use word processing software and other productivity tools to make the schedule

38

aesthetically pleasing was discontinued because the schedule was adjusted so often that it was less efficient than using a pencil and an eraser.

2.   Pre-Deployment Preparations

The Officer in Charge (OIC) of the LEDET scheduled to deploy aboard a USN or allied ship is responsible for this task to be completed **(Table 3.2)**. However, all members of the LEDET perform the preparations required to complete the task. A LEDET OIC performing the pre-deployment preparations must know when his/her team will be departing and this is obtained from the schedule pre-determined by the Operations Officer.

Agent	Officer In Charge
Organization	LEDET
Information Technology Support	-
Information Technology Communications	-
Information Technology Automation	-
Non-Information Technology	Paper Checklist

Table 3.2 – Pre-deployment Preparations Attributes

The task does not involve the use of IT and is completed with the assistance of a pre-deployment checklist that may be performed by one person on the team or the entire team. This depends on how the OIC decides to manage this task.

3.   Report to Ship

This task results in the LEDET reporting to its assigned ship and IT is not used to complete the task **(Table 3.3)**. This involves the OIC properly reporting and introducing himself/herself to the ship's Commanding Officer, the Executive Officer, the Operations Officer and other key personnel.

Agent	Officer In Charge
Organization	LEDET
Information Technology Support	-
Information Technology Communications	-
Information Technology Automation	-
Non-Information Technology	Various

Table 3.3 – Report to Ship Attributes

Also, other steps in this task include the LEDET properly conducting a turnover with the departing LEDET if necessary. This includes manually accounting for all weapons and ammunition, accounting for all the necessary equipment found in the Law Enforcement Support Kit (LESK), and showing the reporting LEDET their berthing area and locker space to name a few. The LESK contains all the possible equipment the detachment may need during a deployment. For example, it contains cutting torches if the need to conduct a destructive search arises and extra handcuffs if a large number of people need to be restrained.

4. Detect and Monitor

The primary agent for this task with respect to the LEDET deployment process is the USN or allied vessel. It consists of using the vessel's resources to attempt to locate air, surface, and possibly subsurface vehicles used to smuggle narcotics to through transshipment areas. The resources used may include a deployed helicopter, the vessel's radar and sonar equipment, and other electronic packages included in the vessel's war-fighting arsenal. Other DoD and law enforcement assets are used to conduct the Detect and Monitor task. For example, aircraft with the capability of conducting long-range reconnaissance are used to support surface assets. However, for the purpose of this thesis, this task specifically pertains the surface asset, namely the USN or allied vessel.

Agent	USN Ship
Organization	U. S. Navy
Information Technology Support	Various
Information Technology Communications	Various
Information Technology Automation	-
Non-Information Technology	-

Table 3.4 – Detect and Monitor Attributes

5. Identify Target of Interest (TOI)

The agent performing this task is the LEDET watchstander standing watch in the Combat Information Center (CIC) of the deployed vessel (Table 3.5). "Watchstander" is a term used in the naval services to describe a person that performs a specific duty, during a specified time period at an operational unit.

Agent	LEDET Watchstander
Organization	LEDET
Information Technology Support	Various
Information Technology Communications	Various
Information Technology Automation	-
Non-Information Technology	Visual

Table 3.5 – Identify Target of Interest Attributes

In this case, a LEDET watchstander is a LEDET member that stands "watch" as the law enforcement expert while a naval vessel is conducting drug operations. This person is charged with determining whether or not a surface vessel, also known as a "contact," that is detected is of any law enforcement interest based upon inputs received from the deployed vessel's resources. These resources include information received from lookouts, watchstanders manning the radar scopes in CIC, information that the deployed vessel's helicopter may have obtained during a flight, and any other pertinent information such as intelligence information available on a particular contact. If the watchstander determines that the contact is a TOI, then he/she informs the OIC and proceeds to make preparations for the Pre-boarding task. Otherwise, this task is completed and the Detect and Monitor task continues until the next contact.

6. Pre-Boarding

The pre-boarding task is conducted by the OIC, the designated Boarding Officer for the pursuant boarding, and the watchstander who initiated the pre-boarding task (**Table 3.6**). As the name implies, this task involves making preparations to conduct a boarding of the TOI. The boarding is conducted by a boarding team, which consists of two or more of the LEDET personnel. The preparations consist of asking the TOI a series of questions (known as pre-boarding questions) that provide the boarding officer (BO) and the boarding team information needed to conduct a safe and thorough boarding. For example, the boarding officer may ask the master of the vessel how many people are on board, if there are any weapons onboard, and how long they have been at sea. Also, the tone of the master's responses and the amount of cooperation that the master provides may provide an indication of whether or not the boarding team should be more suspicious when they actually board the vessel.

Agent	OIC, Boarding Officer, Watchstander
Organization	LEDET
Information Technology Support	LEIS II & EPIC
Information Technology Communications	-
Information Technology Automation	-
Non-Information Technology	-

Table 3.6 – Pre-boarding Attributes

This task uses two databases, the Law Enforcement Information (LEIS) II and the database maintained by the El Paso Intelligence Center (EPIC), to determine if the vessel, the master, and the crew have any criminal history. Currently, a LEDET must download LEIS II updates prior to departing on a deployment because they do not have access to the database while deployed. This results in outdated information if updates to the database are made during the deployment. EPIC information is received via voice

42

communications from the Coast Guard district the LEDET and naval vessel are operating under during law enforcement operations.

7.   Boarding

The boarding task is the act of conducting a boarding of the TOI. A boarding is a methodical series of actions that the boarding team conducts to determine whether or not the vessel is smuggling narcotics **(Table 3.7)**. A boarding begins by the boarding team coming on board the vessel and conducting an *initial safety inspection (ISI)*. An ISI determines whether or not the vessel is safe for the boarding team to be on board. If it is not, the boarding team must remedy the danger or leave. An ISI includes neutralizing general or known hazards to the boarding team, securing known weapons, and accounting for all crewmembers claimed by the master during the pre-boarding phase.

Agent	LEDET
Organization	LEDET
Information Technology Support	Digital Camera
Information Technology Communications	-
Information Technology Automation	-
Non-Information Technology	Various

Table 3.7 – Boarding Attributes

After the ISI is complete the boarding team will continue with the boarding. The series of steps required during the boarding process is determined by whether or not the vessel is U. S. flagged or if it is foreign. However, the skills, experience, and the process required to locate contraband is constant regardless of what flag the vessel claims.

A digital camera is used to take pictures of the vessel during the boarding. These pictures are stored in the boarding matrix database as part of a record of the boarding. The boarding matrix database is a database of boardings that was developed in house and is maintained by the operations officer. It contains information and pictures regarding

boardings conducted by the PACAREA TACLET detachments. No other IT is used to assist in the completion of this task.

8. Locate Contraband

This task involves the discovery of contraband on board a vessel (Table 3.8). Equipment used to assist the boarding team with this task includes the use of an ionscan (a device that detects minute molecules of marijuana, cocaine, or methamphetamines), a borescope, which is a fiber optic camera that allows a person to peer into walls or other voids in the vessel, infrared cameras, and numerous other "high-tech" gadgets. Locating contraband also involves a boarding team member's senses and ability to notice any inconsistencies found in the construction of the vessel, the mannerisms of the master and his crew, and other conditions that do not correspond to a vessel innocently transiting the high seas.

Agent	LEDET
Organization	LEDET
Information Technology Support	-
Information Technology Communications	-
Information Technology Automation	-
Non-Information Technology	Human Senses

Table 3.8 – Locate Contraband Attributes

9. Seize and Arrest

This task involves seizing the vessel and the contraband and arresting the master and the crew **(Table 3.9)**. Once this task is initiated the boarding team becomes responsible for the safety and well being of the prisoners. Also, the vessel becomes a crime scene and the boarding officer becomes responsible for ensuring that no evidence is tampered with. Arresting a crewmember involves conducting a search of his/her

garments to ensure that he does not have weapons or other contraband that may harm the boarding team.

Agent	LEDET
Organization	LEDET
Information Technology Support	-
Information Technology Communications	-
Information Technology Automation	-
Non-Information Technology	-

Table 3.9 – Seize and Arrest Attributes

10.   Take Custody

Taking custody involves processing the prisoners and transferring them to a secure area on the naval vessel **(Table 3.10)**. Prisoner processing includes ensuring that the prisoners are healthy and receive any medical treatment if necessary, providing them with adequate food and water, and ensuring that they are guarded until they can be transferred to a shore facility.

Agent	LEDET
Organization	LEDET
Information Technology Support	-
Information Technology Communications	-
Information Technology Automation	-
Non-Information Technology	-

Table 3.10 – Take Custody Attributes

11.   Create Case Package

This step supports the prosecution of the master and the crew for smuggling narcotics **(Table 3.11)**. It involves items such as the boarding team writing statements regarding the actions during the boarding, compiling evidence such as photographs, sketches of the vessel, results from narcotics identification tests, and other statements from naval personnel who may have been involved with supporting activities such as the lookouts. A case package is evidence collected by the LEDET that will be used in court if

45

those suspected of smuggling drugs are prosecuted. In general, the case package is used in American courts. However, there are instances where the LEDET is told to transfer custody of all the suspects and evidence to a foreign agency. In any event, guidelines on how to create a case package are acquired from the MLEBOC, BO PQS, informal training, and OJT. A well documented case package requires that the statements provided are thorough and consistent, that there are supporting documentation such as log entries and pictures, and that any questions asked regarding the case can be found within the case package.

Agent	LEDET
Organization	LEDET
Information Technology Support	Word Processing
Information Technology Communications	-
Information Technology Automation	-
Non-Information Technology	Interviews

Table 3.11 – Create Case Package Attributes

12. Transfer Custody

The LEDET will normally be directed to transfer the prisoners and the seized vessel to either U. S. law enforcement agencies or foreign officials depending on the arrangements made by the State Department and other senior government officials **(Table 3.12)**. This transfer may occur at sea or at a designated shore facility. The transfer consists of turning over all the evidence, the case package, prisoners, and the vessel. A proper transfer to a U. S. agency requires that a chain of custody be kept. This means that the receiving agency will only accept responsibility for the prisoners, the seized vessel, and the evidence after a proper inventory is conducted and after the LEDET officially releases control of the previously mentioned items. After the transfer

46

of custody, the LEDET will return to *the detect and monitor task* if the LEDET has not

completed its deployment.

Agent	LEDET
Organization	LEDET
Information Technology Support	-
Information Technology Communications	-
Information Technology Automation	-
Non-Information Technology	Paper Forms

Table 3.12 – Transfer Custody Attributes

13. Depart Ship

Once the LEDET has completed its deployment it will depart the naval vessel

(Table 3.13). The *Report to Ship* task is conducted by another LEDET if it is relieving

the LEDET currently on board the naval vessel. Otherwise, the departing LEDET has no

other responsibilities and will depart the ship. This task involves ensuring that all the

weapons and other support equipment are accounted for, all required messages, such as

the LEDET departure message, have been released, and other administrative

responsibilities have been completed.

Agent	LEDET
Organization	LEDET
Information Technology Support	-
Information Technology Communications	Message System
Information Technology Automation	-
Non-Information Technology	Checklist

Table 3.13 – Depart Ship Attributes

14. After Action Process

The LEDET will conduct an after action process upon returning to TACLET

(Table 3.14). The task involves using word processing software for IT support and

electronic mail and the military message system for IT communications. This process

involves debriefing the TACLET staff (CO, XO, OPS), filing a deployment summary,

updating the boarding database, and completing any intelligence information reports. The AAR task is a culmination of the deployment process. It provides feedback and a summary of the deployment to the Pacific Area Commander, PACAREA TACLET Commanding Officer, and other high level organizations.

Agent	LEDET
Organization	LEDET
Information Technology Support	Word processing
Information Technology Communications	Email, message traffic
Information Technology Automation	-
Non-Information Technology	-

Table 3.14 – After Action Report Attributes

The AAR may be used as training for other LEDETs, as a tool to support a change in policy or procedures, or simply as a historical record of deployments. To provide this information an OIC must know what events occurred during a deployment and determine what events had significance regarding the above issues or any other issues with Coast Guard significance. Also, the OIC must understand what needs to be documented in an AAR. These requirements may change based on policies set by organizations that use the AARs.

D. KNOWLEDGE-BASED ORGANIZATIONAL PROCESS REDESIGN (KOPER)

KOPeR is a knowledge based system (KBS) redesign system that uses measurement –driven inference to automate three activities required for process redesign (Nissen 1998). These three activities are process measurement, pathology diagnosis, and transformation matching. Simply put, KOPeR uses a set of rules to provide recommendations on how to reengineer processes given a set of measurements. These measurements are summarized in Table 3.15, which was taken from Nissen (1998).

48

Measurement	Graph-Based Definition
Process Length	Number of Nodes in longest path
Process Breadth	Number of distinct paths
Process Depth	Number of process levels
Process Size	Number of nodes in process model
Process Feedback	Number of cycles in graph
Parallelism	Process Size divided by Length
IT Support	Number of IT-support attributes
IT Communication	Number IT-communications attributes
IT Automation	Number of IT-automation attributes
Organizational Roles	Number of unique agent role attributes
Process Handoffs	Number of interrole edges
Organizations	Number of unique agent organization attributes
Value Chains	Number of unique activity Value Chain attributes

Table 3.15 – KOPeR Process Measurements

KOPeR analyzes a process and determines what pathologies the process

suffers from. Specific attributes of the process are given a value to describe the presence

of a particular characteristic. The meanings of these values are summarized in **Table**

3.16.

Attribute	Value Definition
Parallelism	1.00 (Sequential process) – N (Parallel process)
Handoffs	0.0 (No fragmentation) – 1.0 (Fragmented process)
Feedback	0.0 (No friction) – 1.0 (High process friction)
IT support	0.0 (Inadequate IT support) – 1.0 (High IT support)
IT communication	0.0 (No IT comms) – 1.0 (High IT comms)
IT automation	0.0 (No IT automation) – 1.0 (High IT automation)

Table 3.16 – KOPeR Attributes and Values

Finally, KOPeR provides recommendation on how to remedy any

pathology the process suffers from after providing a diagnosis of the process. For

example, KOPeR may suggest making the process more parallel by assigning a case

manager or case team to perform the process tasks instead of having specialist. It is

important to note that KOPeR provides recommendations based on the values calculated

by the measurements provided by a user. KOPeR does not have the capability to determine whether or not the pathologies a process suffers from is acceptable or not. For example, the CN Deployment process suffers from being a sequential process. However, this does not necessarily mean that the pathology is unacceptable because KOPeR does not have the capability to determine whether or not the sequential nature of the process is required. In this case, all the tasks require that the task immediately before it must be completed before the next task can begin.

E. PROCESS ANALYSIS

Diagnostic measurements and an analysis of the deployment process are conducted using the KOPeR system (Nissen 1998). These measurements are summarized in **Table 3.17**. Several process pathologies can be diagnosed based on the value of the measurements obtained by the KOPeR system.

The first pathology involves the parallelism value of 1.00. This value indicates that the process suffers from a sequential process flow pathology, which leads to cycle time problems. However, this process seems to be inherently sequential, because each task is dependent upon the prior task being completed. For example, prior to beginning the *ID TOI* task, the *Detect and Monitor* task must be properly completed. Another example is the *Locate Contraband* task, which cannot be initiated until the *Boarding* task has been initiated. In this case, the *Locate Contraband* task occurs during the *Boarding* task. Furthermore, the process cycle time is not a critical issue. An attempt to significantly decrease the cycle time may lead to compromising one or more of the CSFs.

More specifically, the *No personnel injuries or deaths* CSF requires that the LEDET is deliberate, thorough, and cautious when executing a several of the process tasks.

Measurement	Value	Diagnosis
Process Size	14	-
Process Feedback	.143	OK
Parallelism	1.00	Sequential Process Flow
Organizational Roles	.50	Job Specialization
Process Handoffs	.214	OK
Organizations	.21	OK
Value Chains	2.00	Process Friction
IT Support	.429	OK
IT Communication	.359	Paper Based
IT Automation	0	Labor Intensive Req substantial infrastructure

Table 3.17 – Diagnostic Measurements for CN Deployment Process

The next noteworthy pathology is indicated by the *organizational roles* and the *process handoffs* values. These values assist in detecting *bureaucratic organization* pathologies (Nissen 1998), which tends to hinder knowledge creation. The organizational roles measurement (.500) represents the number of unique agent role attributes. A high value indicates that the organizational structure promotes job specialization. Process handoffs represent the number of inter-role edges (.214), and a high value indicates a fragmented process flow. Used together, these values may indicate that the process tends to be bureaucratic and suffers from process friction. In the CN deployment process the values are both moderate, which indicate that there is a level of specialization at the agent level that is required to complete the process in its current form. Looking at the process closer shows that a majority of the process is conducted by the LEDET or a member of the LEDET and tasks not conducted by the LEDET are tasks

that support the LEDET in successfully achieving the process goal. The other agents allow the LEDET to concentrate its skills and knowledge towards meeting the CSFs.

Also evident from the diagnosis (Value Chains value of 2.00) is that there are actually two separate organizations taking part in this process: the Coast Guard and the U. S. Navy. This structure represents the two distinct roles authorized by legislation. Namely, the DoD's legislative responsibility for the detection and monitoring mission, and the Coast Guard's duty to conduct law enforcement from DoD platforms. Having two distinct organizations involved in the completion of a process increases process friction and extends the life cycle of the process. Also, misfits may occur if improper integration methods are used for communication between the two organizations. In this case, the LEDET OIC onboard the naval vessel acts as the liaison to ensure that the process is properly executed.

The three IT values measure the use of information technology during the process. Overall, the IT values are relatively low and can be incorporated much more in ways that can benefit the overall execution of the process. IT support (.429) technologies are used in a respectable number of tasks in the process. However, IT communication (.357) and IT automation (0.0) values are relatively low indicating that the process is both paper based and labor intensive. The lack of IT contributes to the length of the cycle time, particularly in the amount of time it takes to complete the *Assign LEDET to Deployment* and the *Report to Ship* task. For instance, the Operations Officer can automate the *Assign LEDET* task by using software applications to assign LEDETs to deployments based on criteria set by the TACLET staff. Also, IT can be used to assist in

the turnover inventory that takes place when LEDETs relieve one another from a naval vessel.

F. KNOWLEDGE ANALYSIS

Knowledge analysis begins by identifying what the LEDET's goal is when performing the CN deployment process. Based on legislation that assigned the Coast Guard the responsibility of conducting drug enforcement operations aboard DoD assets, the Coast Guard's strategic plan, interviews with personnel from PACAREA TACLET, and personal experience, the following has been determined to be the goal of the LEDET CN deployment process: *Identify vessels attempting to smuggle illegal drugs into the United States and locate where on the vessel drugs are being hidden.*

The following list of Critical Success Factors (CSFs) was determined by analyzing the LEDET deployment process, interviewing various LEDET personnel, and my own personal experience. These four CSFs balance the importance of ensuring that the safety of LEDET personnel is not unnecessarily jeopardized and the LEDETs' mission is accomplished.

1. No personnel injuries or deaths.
2. Conduct a legal boarding consistent with U. S. Coast Guard policies, rules and regulations
3. Locate drugs presently on board the vessel.
4. Collect Intelligence that will help in locating drugs when a vessel is boarded in the future.

The achievement of each of the individual CSFs and the success of the deployment process is highly determined by the successes achieved in adequately performing the following tasks: *Identify TOI, Pre-boarding, Boarding, Locate Narcotics,*

Seize & Arrest, and *Take Custody.* Likewise, each of these tasks requires a minimum level of training, experience, and knowledge (both tacit and explicit) that contributes to the accomplishment of the process goal. The knowledge required for each task and how the knowledge is acquired is discussed in detail below and summarized for each node in the following tables.

1. Identify Target of Interest (TOI)

The LEDET watchstander works with the naval vessel's crew to identify surface contacts that may be carrying a shipment of drugs. A LEDET watchstander must be able to identify vessels that may be involved in smuggling drugs based on visual and electronic observations and information in order to pursue a more thorough investigation.

Information Required	Knowledge Required (Corresponding CSF)	How Knowledge is Acquired
Vessel Description Vessel Activity	Knowledge of "typical" TOI profile (3)	Watchstander PQS OJT Various reports/documents Intelligence reports
Vessel Location	Familiarity w/ local peculiarities (2, 3)	OJT Various reports Conversations with experienced personnel Intelligence Reports

Table 3.18 – Identify Target of Interest Knowledge Analysis

A person begins developing this knowledge by standing watch with a person who is already qualified for the position and discussing items found in the PACAREA TACLET Watchstander Personal Qualification Standards (PQS). A PQS is a minimum list of job oriented tasks and knowledge that a person must complete or acquire as a pre-requisite for requesting a qualification board. A qualification board convenes to determine whether or not the person is prepared to stand the watch alone. This procedure

follows the standard qualification process for a majority of the skill based positions and will be discussed in more detail later.

Qualification only signifies that the person has met the minimum standards for a LEDET watchstander, however, OJT, studying documents such as intelligence messages, and continuing to discuss situations with other watchstanders is required for the knowledge to evolve. Experience is an important aspect in developing the knowledge required for this task to succeed because a keen knowledge of the operating area is required to perform this task well. A short list of what type of knowledge must be acquired include a watchstander being familiar with how, where, and when fishermen normally conduct fishing operations, where are the shipping lanes in the operating area, what is the geography and were there recent seizures or intelligence indicating that the area is a common route for smugglers, and is the area frequented by "go-fast" type boats. Go-fasts are small boats usually made of wood or fiberglass and can travel at very high speeds. This type of knowledge is only developed from experience and sharing experiences with others.

This task is the first task whose result directly affects whether or not the process goal is achieved because if a LEDET is unable to identify vessels possibly involved in smuggling narcotics the process fails. Therefore, it is critical that watchstanders are experienced and given the opportunity to acquire knowledge.

2. Pre-Boarding

Pre-boarding procedures consist of the LEDET preparing for the boarding of a TOI. Properly preparing for a boarding is critical in ensuring that the boarding team is

safe and that the boarding is executed such that the boarding team has no doubt that when they depart the vessel that they are sure that no drugs are being hidden anywhere on board. Knowledge of how pre-boarding procedures are conducted is learned from the Boarding Officer PQS, with the assistance of a qualified boarding officer or OIC when still working towards the qualification, and from attending the Maritime Law Enforcement Boarding Officer Course (MLEBOC). As with the LEDET watchstander qualification procedures, these two methods of knowledge acquisition are just the initial steps. Further experience is gained through OJT and conducting mock boardings prior to a LEDET deploying. It is important to note that this task is a team effort and it requires that all members are familiar with the procedure. Likewise, it takes time, training, and working together for a LEDET to complete this task at a high level of performance.

Information Required	Knowledge Required (Corresponding CSF)	How Knowledge is Acquired
Coast Guard Pre-boarding policies & procedures	Expertise in Pre-boarding procedures (1, 2, 3, 4)	OJT Boarding Officer PQS MLEBOC Training (Mock Boardings)

Table 3.19 – Pre-boarding Knowledge Analysis

Many observations can be made during this task to assist in achieving the process goal, but it normally takes the efforts of all members to provide the boarding team a good "picture" of what to expect prior to "going over the gunnel." In general, when a detachment is at the beginning stages of deploying together, the OIC or the boarding officer normally orchestrates the pre-boarding task. In other words, the knowledge of how to conduct the task is explicit, however, as the team continues to work together the action becomes internalized (becomes tacit).

3. Boarding

An analysis of the boarding task shows that PACAREA TACLET personnel conducting boardings are required to complete formal training requirements. Formal training refers to courses such as the Maritime Law Enforcement Boarding Officer Course (MLEBOC) and the unit's qualification process for a particular job description. For example, a LEDET Officer in Charge (OIC) must be a graduate of the MLEBOC and must successfully complete the unit's OIC qualification process before he/she can be designated an OIC. Completion of formal training provides a person with baseline knowledge of the Coast Guard's *standard boarding procedures*. LEDET personnel obtain the minimum amount of knowledge required to complete the task by meeting these minimum requirements, albeit, the task may not be completed successfully.

The majority of the knowledge obtained by formal training is explicit. For example, standard boarding procedure knowledge is explicit because it can easily be articulated. The Coast Guard distributes the basic law enforcement (LE) knowledge a person must have by several means. These methods include the completion of Personal Qualification Standards (PQS), law enforcement policies detailed in publications such as the Maritime Law Enforcement Manual (LEMAN), and through formal training courses such as the Maritime Law Enforcement Boarding Officer Course (MLEBOC) and the Boarding Team Member Course.

Formal training provides a person with an awareness of other types of knowledge, which are required to successfully complete a boarding. However, these knowledge requirements are more tacit and are more difficult, if not impossible, to distribute and transfer throughout a single LEDET much less other LEDETs. Instead, development of

such tacit knowledge usually occurs through on-the-job training (OJT). This is especially

true for performing a risk assessment and maintaining situational awareness.

Information Required	Knowledge Required (Corresponding CSF)	How Knowledge Is Acquired
Coast Guard boarding procedures & policy	Expertise in Standard Boarding Procedures (1, 2)	Boarding Officer/Boarding Team (BO/BTM) Member School BO/BTM Personal Qualification Standards (PQS) Maritime Law Enforcement Manual Training
Material Condition of Vessel Demeanor of Master & Crew Master & Crew profile/history	Risk Assessment (1)	On-the-job-Training (OJT) "Familiarity Training"
Boarding Team location Master & Crew location Vessel configuration	Situational Awareness (1, 2, 3, 4)	OJT Familiarity Training
Type of documentation required	Expertise in U. S. Vessel Documentation (2, 3, 4)	Training (Examples) OJT
Type of documentation required	Expertise in foreign vessel documentation (2, 3, 4)	Training (Examples) OJT
Location of Vessel	Common practice by mariners who normally travel in area where boarding is being conducted (3, 4)	OJT Conversations with vessel crewmembers Sharing experiences with other LEDETs
Team member experience	Knowledge of Team Strengths and Weaknesses (1, 3)	Training (various team building exercises) Team experiences acquired over time Ready for Operations (RFO)
Vessel configuration Vessel material condition Location of possible weapons	Ability to identify hazards to Boarding Team (1)	OJT Training Experience
Intelligence requirements	Ability to gather intelligence information that may be helpful for other boarding teams in the future (4)	OJT Training Experience

Table 3.20 – Boarding Knowledge Analysis

Furthermore, development of expertise in understanding how to read vessel

documentation and applying the information to assist in creating a picture of what

activities the vessel is conducting requires experience via OJT and specialized training.

A simple example would be identifying a vessel's cargo manifest and comparing what is listed in the cargo manifest to what the vessel is actually carrying.

Personal knowledge of the LEDET's strengths and weaknesses as well as the strengths and weaknesses of each individual team member requires extensive training focused towards team building and team preparedness such as the annual ready for operations (RFO) evaluation, and OJT which allows the LEDET to acquire team experiences over time. An RFO is an annual event that consists of evaluating a LEDET in all operational readiness areas. This includes everything from weapons and equipment use proficiency to ensuring that the team is administratively complying with Coast Guard and TACLET standards.

Knowledge regarding how to gather intelligence and identify items that may be important for future boardings of the vessel currently being boarded is a vital skill. This knowledge is acquired by awareness training and informing personnel of what type of information must be collected. Standard collection items include the type of electronics suite aboard the vessel, information regarding the vessel's recent voyages, the identification of crew personnel, and pictures of the vessel. But, there are other subtle and more difficult types of information that can be collected, just as valuable, and may provide intelligence analysts key pieces of information that they have been searching for. For example, experienced boarding personnel can illicit information from vessel crewmembers regarding the structure of their organization and who the key personnel are. From this information analysts may be able to develop a profile of an organization that is using a fishing company as a cover for its illegal operations. The ability to collect information that seems meaningless, but understanding how the intelligence community

59

can use the information that is gathered, is developed through experience and understanding the "big picture."

Collecting intelligence information that may help boarding teams in the future is a critical success factor because if drugs are not currently on the vessel, but evidence points that the vessel has been and will be used as a vehicle to smuggle drugs, then it is vital that future boarding teams are armed with as much information as possible so that they may succeed during their iteration of the CN deployment process.

4. Locate Narcotics

Success in completing the *locate narcotics* task is more difficult than performing the boarding task, because it is much more dependent on the level of tacit knowledge the LEDET has. This is because locating narcotics requires a person to identify subtle indicators that may be present during a boarding. Awareness of what indicators to look for can be provided through formal training. However, the ability to identify these indicators in a boarding environment relies heavily on the experience of the LEDET and the individuals that make-up the LEDET.

Information Required	Knowledge Required (Corresponding CSF)	How Knowledge is Acquired
Visual indicators	Ability to identify hidden compartments (3, 4)	OJT/Experience Training
Vessel diagrams Vessel specifications	General knowledge of the structure of sea going vessels (3, 4)	Training OJT Vessel "charts"
Crew demeanor Conversational information	Ability to interpret clues given by crew members & correlate them with indicators physically found on vessel (3, 4)	Training OJT
Vessel location	Familiarity with common drug smuggling routes in the area (3, 4)	Intelligence Past After Action Reports (AAR) Training OJT

Table 3.21 – Locate Narcotics Knowledge Analysis

The items listed under the *knowledge-required* column are all acquired and fine tuned via OJT. There are other sources for the acquisition of these knowledge areas; however, OJT is required in order for an individual and a team to be able to piece together each of the indicators that may be present to locate the drugs. The following example best illustrates how the knowledge listed above is used to complete the task successfully.

Intelligence Reports and past After Action Reports provide the LEDET with the knowledge and experience obtained from other boarding teams and units that have conducted CN deployments in the past. These can be very valuable in providing personnel with virtual experiences and knowledge regarding previously boarded vessels, routes and areas frequently used by smugglers, trends in where drugs are being hidden, and other valuable insight that a LEDET can benefit from.

An example: Say that a LEDET on a CN deployment intercepts a vessel in the Caribbean and identifies the following indicators:

Pre-boarding Phase:
- 200' Long-line fishing vessel headed on a course of 300°T at 7 knots
- Bow of vessel is riding high with water line significantly above the water
- Stern is riding low with no water line showing
-
- Master states that he is on his way to the fishing grounds and currently has no fish because he just dropped a load off at the nearest port
-
Boarding Phase:
- 50 to 60 50 gallon drums of fuel on deck
- Fishing nets are new and have not been used
- Access to fuel tanks have new bolts and new gaskets

- Vessel was built in 1971
- Ion scan "hits" indicate cocaine levels close to two thousand and get higher below the main deck and converge towards accesses to the vessel's fuel tanks

The average or inexperienced person may not find any of these statements peculiar if each indicator at looked at alone or even if they were looked at as a whole. However, a person who is experienced in CN operations may interpret these indicators differently. The pre-boarding phase indicates that there is a vessel with weight unevenly distributed with the majority of the weight towards the stern. The vessel is traveling at a relatively slow speed given the fact that she is on her way to a designated fishing ground. Normally, fishing long-liners of this size can travel faster and would be expected to travel faster than 7 knots if the crew is on its way to fish at a particular area. This is because fishing is a business, and as with any business, time is money.

The boarding phase provides an even clearer picture of what activities the crew may be involved in. The fishing nets look new, which indicate that they may have not yet been used. This is contrary to what the Master stated. The Master stated that they just dropped off a load of fish, which means that they should have already used the fishing nets. The vessel has fuel on deck despite the fact that she had just been in port. Couple this indicator with the fact that the accesses to the fuel tanks look like they were previously opened and the gaskets and the bolts were replaced and ion scan "hits" indicate cocaine being dragged to the lower decks of the ship. These indicators would lead an experienced LEDET to believe that this vessel is being used to smuggle cocaine.

The scenario portrayed above is an oversimplified case, but it briefly illustrates how important a LEDET's collective knowledge is important to successfully performing the locate narcotics task.

5. Seize and Arrest & Take Custody

The *seize and arrest* task and the take custody task have been combined in this table. Again, as with the boarding task, a portion of the knowledge required to complete these tasks is explicit and can be acquired from several sources. These sources include formal training in the form of PQS and the MLEBOC. However, more comprehensive knowledge is gained from virtual experiences such as mock boardings and case studies, and by OJT. Knowledge on how to conduct this task thoroughly is critical because the safety of the LEDET and the personnel on the naval vessel is at stake. For instance, when a person is arrested, a search of his/her person is conducted to ensure that they have no instruments on their person that can be used as a weapon or means of escape. Missing these types of instruments jeopardizes the accomplishment of one of the CSFs, namely "no personnel injuries or death," despite the fact that the narcotics may have been discovered.

Information Required	Knowledge Required/ Corresponding CSF	How Knowledge is Acquired
Seize & Arrest policy and procedures Custodial policy and procedures	Knowledge of Seize and Arrest Procedures (1) Knowledge of Custody Procedures (1)	MLEBOC OIC PQS BO/BTM PQS Training Mock Boardings Unit training Case Studies/Scenarios OJT

Table 3.22 – Seize and Arrest & Take Custody Knowledge Analysis

F.   KNOWLEDGE MANAGEMENT ANALYSIS

The knowledge management analysis consists of extending the horizontal CN deployment process and determining what vertical-flow processes reflect the success of its performance across time and across different LEDETs. The primary vertical-flow processes identified from the analysis above listed below and depicted in **Figure 3.3**:

- Assigning Personnel to LEDET process
- Deployment Summary/Deployment Debrief Process
- Qualification Process
- Training Process
- On-the-Job Training/Mentoring Process
- IT Support

Figure 3.3 shows two instantiations of the CN deployment process introduced in **Figure 3.2** along with the vertical-flow processes. The two instantiations of the primary process represent the primary process being performed during two distinct and separate situations. For example, the first instantiation (labeled "LEDET 1") could be performed by a LEDET at a particular point in time and the second instantiation (labeled "LEDET 2") represents the primary process being performed by a different LEDET at another point in time. The focus of knowledge management given two instantiations of the primary process is the consistency and efficacy of its performance. An analysis of the vertical-flow processes, which are identified above, aims to improve knowledge transfer across the PACAREA TACLET organization with regards to the CN deployment process performed by its LEDETS.
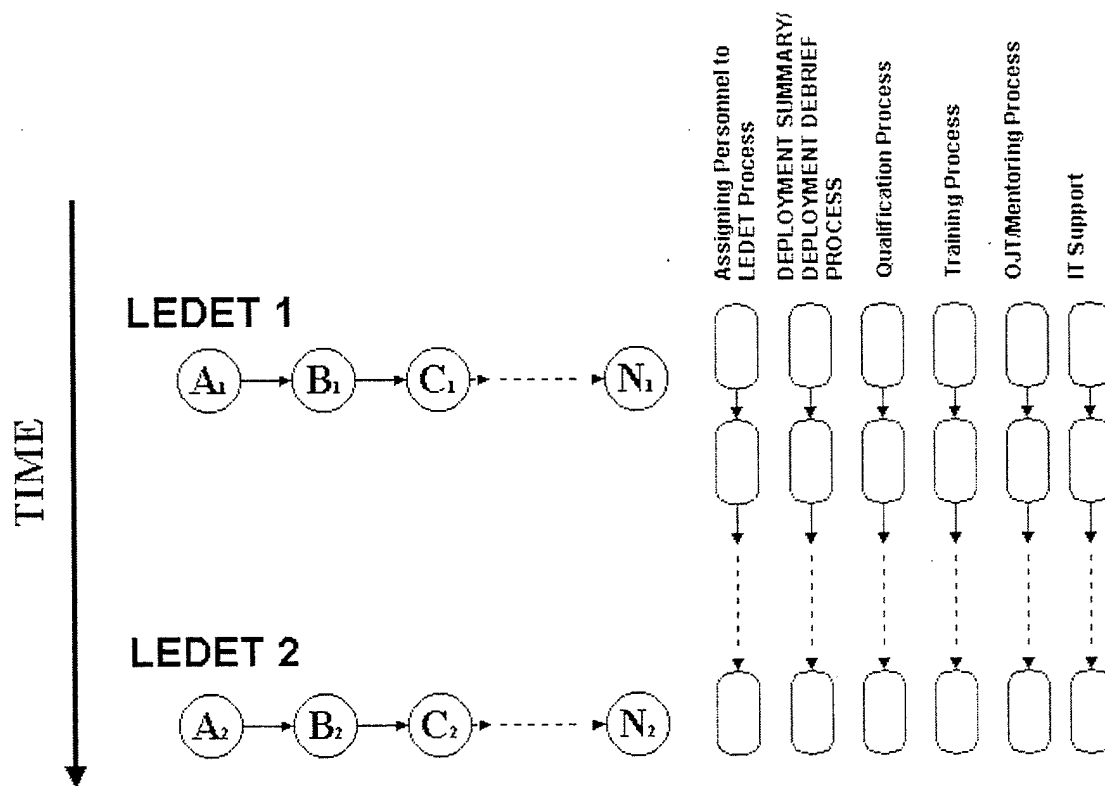
Figure 3.3 – Multiple Instantiations of Primary Process w/ Vertical Flow Processes

1. Assign Personnel to LEDET Process

The *Assign Personnel to LEDET* vertical-flow process (Figure 3.4) determines what LEDET a new member to TACLET will be assigned to. The command cadre, who consists of the Commanding Officer (CO), Operations Officer (OPS) as well as the Executive Officer (XO), conducts a majority of this process. A TACLET yeoman is responsible for sending, via the standard mail system, the new member a "welcome aboard" package. The package includes a questionnaire that must be filled out by the member. The questionnaire consists of questions regarding his/her background such as what kind of Coast Guard experience he/she may have, how extensive is his/her law enforcement background, uniform measurements, and other information that will assist

the TACLET in helping the new person transfer to the area and help TACLET determine

what LEDET the person will be assigned to.
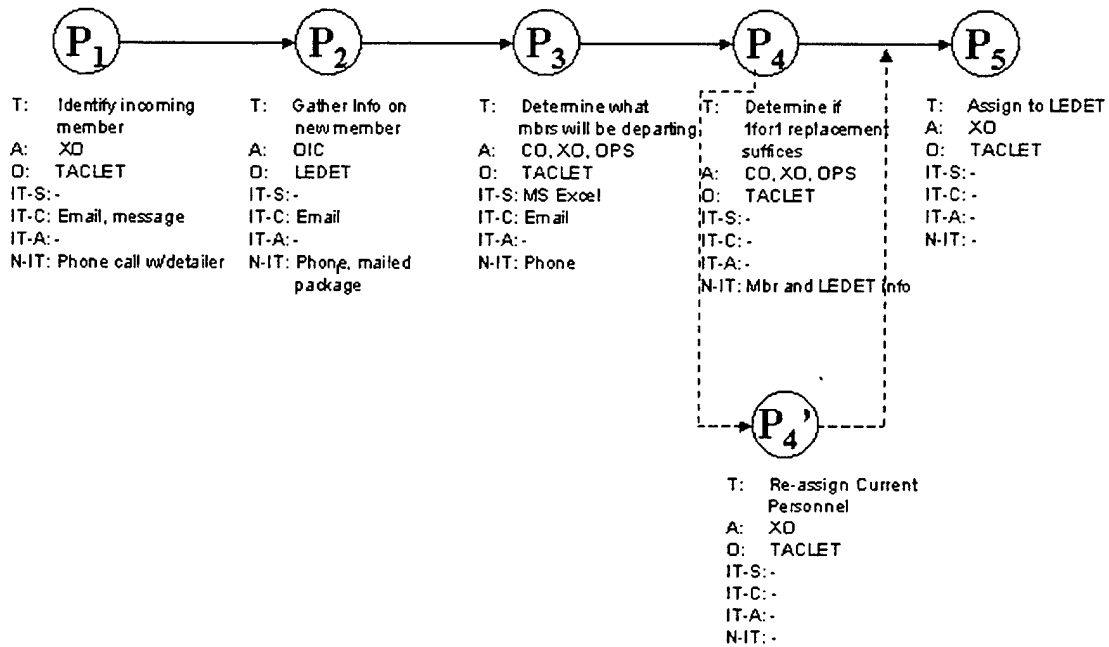
Figure 3.4 – Assign Personnel to LEDET Vertical-flow Process

The issue of whether or not the new member will be assigned to the LEDET

which has a member transferring (one to one switch) or deciding that there has to be a

rearrangement of personnel in two or more of the LEDETs is important. This decision is

based on the strengths and weaknesses of the new member as compared to the strengths

and weaknesses of the LEDETs. For example, if the incoming member does not have

much experience in law enforcement, or any other LEDET mission, this member may not

be assigned to a LEDET that has personnel who may be relatively low in law

enforcement experience as compared to another LEDET. What may happen is that a

member from the experienced LEDET may have to be transferred to the less experienced

LEDET and the new member will be assigned to the more experienced LEDET.

Based on the KOPeR system, this process has a parallelism value of 1.00 with a decision having to be made at node P_4. The parallelism value remains 1.00 even if the rearrangement of personnel (P_4') is necessary. The addition of this task increases the length and the size of the process, thereby increasing the cycle time. Also, the process has a handoffs value of .40, which indicates that there is a level of process friction present in this process. Other noteworthy values are the IT related measurements. The IT-communication value is about .60. This value is respectable due to the fact that email is used to conduct communications between the agents involved with the process. However, IT-support value is below .20 and the IT-automation value is .00. These measurements categorize this process as a sequential flow process that is performed manually.

IT-support is provided by the use of a spreadsheet to keep track of important LEDET information. This data includes information regarding a LEDET's personnel composition, days the LEDET has deployed during the fiscal year, the qualifications of each member and when they are due for a re-certification, and when the person is due to be transferred. This spreadsheet provides a "snapshot" of each LEDET and assists the command cadre to make operational, personnel, and administrative decisions that affect the LEDET. Maintenance of this spreadsheet is the responsibility of the XO who normally delegates the task to some member of the TACLET staff. Periodically, the LEDETs are tasked to update their portion of the spreadsheet by providing the spreadsheet caretaker with input regarding its accuracy. The input is provided via ink changes and the caretaker updates the spreadsheet that he/she maintains in his/her personal files. Copies of the spreadsheet are distributed to the CO, XO, OPS, OICs, and

other personnel who require the information maintained on the document. The difficulty with this method is ensuring that the information found on the spreadsheet is up to date. No one other than the person maintaining the spreadsheet can conveniently update the information if and when it changes.

2. Deployment Summary/Deployment Debrief Process

T: Return fm Deployment	T: TACLET Staff debrief
A: LEDET	A: LEDET
O: TACLET	O: TACLET
IT-S: -	IT-S: -
IT-C: -	IT-C: -
IT-A: -	IT-A: -
N-IT: -	N-IT: -

T: Draft Trip Report
A: OIC
O: LEDET
IT-S: MS Word
IT-C: Message System
IT-A: -
N-IT: -

T: Update Trip Report Files
A: OPS
O: TACLET
IT-S: MS Word
IT-C: -
IT-A: -
N-IT: Paper File, PACTACLET & other TACLETs

T: Update Dep Matrix
A: OIC
O: LEDET
IT-S: MS Excel, Digital Camera
IT-C: -
IT-A: -
N-IT: Based on IIR for each boarding
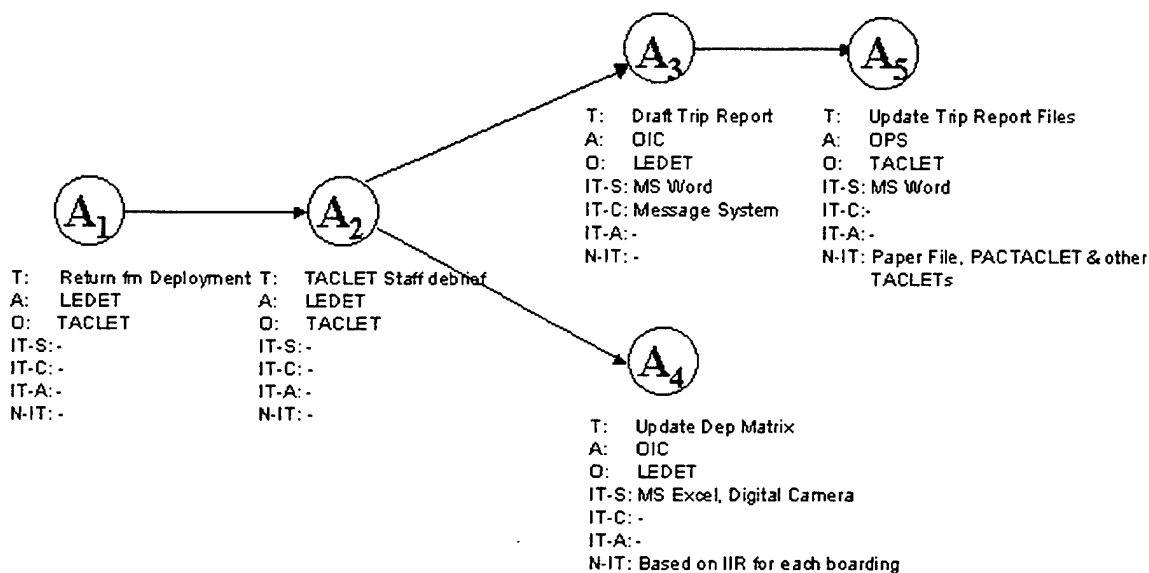
Figure 3.5 – Deployment Summary/Deployment Debrief Vertical-flow Process

The *Deployment Summary/Deployment Debrief Process* (**Figure 3.5**) results in a record of what occurred during the deployment as well as providing the Commanding Officer and the Pacific Area Commander with a summary of the deployment highlights. The result of this process is a face-to-face discussion of the deployment with the CO, XO, and OPS, a deployment summary in message format sent to the Pacific Area Commander, the other regional TACLETS, and other organizations that will benefit from the information provided in a deployment summary.

The process is a sequential process that has a parallelism value of 1.25. The process begins with the LEDET returning from a deployment and the following day the

LEDET is tasked to provide the CO, XO, and OPS with a summary of the deployment. The deployment debrief involves each individual providing their thoughts and summary of the deployment. The debrief provides the CO with different perspectives of the previous deployment. From the debrief, the CO can evaluate whether or not current procedures or policies are relevant or being followed, not only by the LEDET but by other entities involved with the CN mission, the CO can determine if current training being provided to the LEDETs are adequate, he/she can determine the state of morale, and in general become more familiar with each LEDET and each individual within a LEDET.

After the debrief, the OIC is required to draft a deployment summary in message form using a word processing application. The deployment summary is transmitted to the PACAREA Commander, other TACLETs, and other organizations that have a vested interest in the deployments supported by PACAREA TACLET. The Operations Officer maintains copies of all the deployment summaries in a paper file. Also, the OIC is responsible for ensuring that the unit's deployment matrix is updated. The deployment matrix is an "in house" database found on a stand-alone computer used to keep track of all the boardings that TACLET's LEDETs have performed. The information gathered for each boarding is maintained in the database. This information includes which LEDET conducted the boarding, the vessel's information, crew member information, when and where the boarding was conducted, any intelligence related information including any digital pictures that may have been taken, and the results of the boarding.

The information reflected in the deployment matrix is the same information found in an intelligence report called an Intelligence Information Report (IIR). An IIR is a

69

message that must be drafted for each boarding and is transmitted to the *intelligence community* for analysis. The LEDET will generally maintain a copy of the IIR and upon returning from the deployment, the LEDET would just manually transfer information found on the IIR to the deployment matrix.

The IT measurements point towards a system that is generally labor intensive despite the fact that the IT-support value is .60. This is because the IT-communication value is .20 and the IT-automation value is .00. Very little IT is used to make the process more efficient and, more importantly, very little IT is used to aid in transferring knowledge throughout the TACLET organization. The relatively high IT-support value reflects the use of software application tools that add value to the process by producing documents such as the deployment summary. Further, a spreadsheet application is used to store boarding data and information; however, the spreadsheet has very little structure when compared to more complex databases. A level of redundancy is present in the process due to the fact that drafting the IIR is a task separate from updating the deployment matrix. Also, the operations officer maintains a separate paper file for every deployment summary that is transmitted as well as deployment summaries or trip reports sent to PACAREA TALCET by the other regional TACLETs. This system is inefficient in transferring knowledge if the operations officer decides that it would be beneficial for other TACLET personnel to view the files for relevant information or knowledge, for training, or to keep track of any trends or statistics that are contained in the deployment summary. Furthermore, the Atlantic Area TACLETs draft their deployment summaries in a different format and do not transmit them via the message system. Instead, their reports are sent via standard mail.

3. Qualification Processes

There are four qualification processes that this thesis is concerned with regarding knowledge management innovation of the primary process. The qualification processes for becoming an Officer in Charge of a LEDET, a Boarding Officer (BO), a Boarding Team Member (BTM), and a watchstander are all knowledge worker skills that assist in achieving the CN deployment process goal. In general, each of the four qualifications is governed by Coast Guard qualification standards as well as PACAREA TACLET qualification standards that are outlined in the PACAREA TACLET Standard Operating Procedures (SOP). The minimum amount of skills and knowledge required for a LEDET to conduct CN deployment boardings are learned during each of these qualification processes. However, in order for a LEDET to successfully complete the CN deployment process, continuous training, education, and the opportunity to gain more experience is required.

There are several general requirements that must be met by all deployable members who seek any of the qualifications that will be discussed below. First, all members must be qualified for sea duty and must be free of any conditions that will prevent him/her from performing vessel boardings at sea. Secondly, every member must hold a SECRET clearance. Third all members must complete the qualification process for the perspective qualification that they are seeking. Each of the qualifications pertinent to completing the CN deployment process successfully is discussed in detail below.

a. Boarding Team Member

The BTM qualification is required to be completed by every deployable member of TACLET as outlined in PACAREA TACLET's SOP. The process, as illustrated in Figure 3.6, begins with the member reporting to TACLET. Upon arriving to TACLET, new personnel are often required to deploy in order to "fulfill manning requirements" prior to having the opportunity to complete the certification process (PACTACLET INST). Under these conditions the newly arrived member is given an *interim BTM qualification*, which allows the new member to perform boardings during a deployment. This is a standard TACLET, as well as Coast Guard, practice. In fact, this
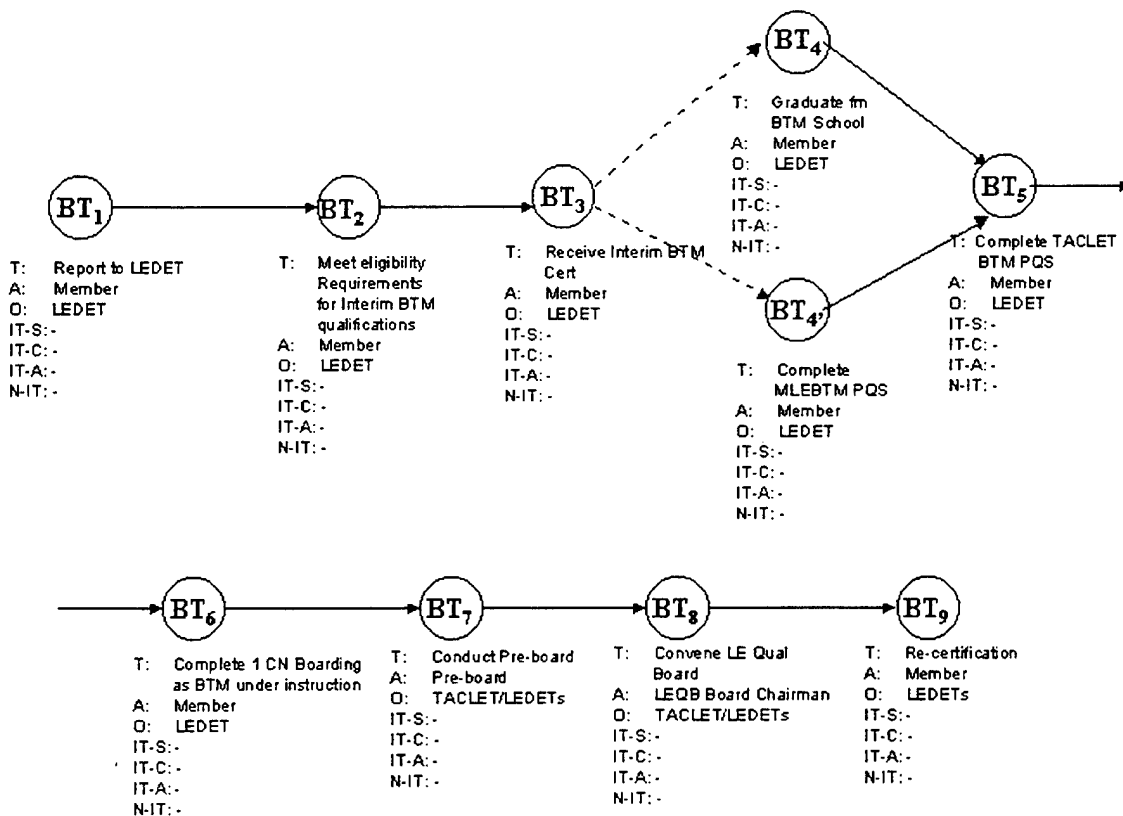
Figure 3.6 – Boarding Team Member Qualification Vertical-flow Process

procedure is encouraged because it benefits the individual by providing him/her invaluable experience, and it allows the unit to use all personnel assigned to TACLET.

Several conditions must be met in order for a person to obtain an interim BTM qualification. First, the perspective BTM must complete several basic tasks found in the Boarding Team Member Personal Qualification Standard (PQS) and his/her OIC must recommend, via a letter or message if deployed at sea, that the member exhibits the judgment, temperament, and proficiency required to conduct the duties of a BTM. These tasks ensure that the member can perform basic skills safely during a boarding as well as provide assistance to other boarding team members if necessary. The tasks include proficiently being able to retain his/her weapon in the event a subject attempts to grab it, being able to handcuff a subject, having an awareness of how to de-escalate a hostage situation, understanding the basics of active information gathering, as well as meeting qualification standards for using all the Coast Guard standard weapons and chemical irritant. Furthermore, the member must perform his/her duties under the instruction of a certified boarding officer or boarding team member.

The interim BTM qualification expires when the member qualifies as a BTM or after six months from the time member reports to TACLET. The qualification process continues with the member attending formal training *or* completing the BTM PQS. Formal training entails a person attending the BTM School, which covers the training and skills required in the PQS. The prospective BTM must also complete a TACLET BTM PQS, which covers specific tasks and knowledge required by a BTM performing TACLET operations.

Attending BTM School is not a requirement for qualifying as a BTM, however, every effort is made by the TACLET Training Officer to send everyone to either the BTM School or, if applicable, to the Maritime Law Enforcement Boarding Officer Course (MLEBOC). Once one of these tasks is complete, the member must take part in a CN boarding at least once before requesting a *pre-board*. A pre-board is an informal board that convenes to ascertain a perspective BTM's level of readiness. Successfully completing the *conduct pre-board* task is required prior to requesting that a Law Enforcement Qualification Board (LEQB) convene. An LEQB is a formal board that convenes "to determine a candidate's depth of knowledge, judgment, and understanding with respect to existing rules, standards, and policies regarding the execution of TACLET's law enforcement mission" (PACTACLET INST)." The composition of an LEQB for a particular qualification depends on the level of responsibility the member is qualifying for. The LEQB for a BTM qualification board must consist of an OIC as the board chairman, and two Boarding Officers each of which are not members of the candidate's detachment. The qualified BTM must continue to make strides to learn more about being a BTM and this is reinforced by the BTM having to re-certify every six months.

The BTM qualification process is essentially a sequential process (parallelism measurement value is 1.111) and does not use IT in any form to complete any of the tasks. Everything from the PQS booklet to the OIC's recommendation to be an interim BTM uses paper. Knowledge is transferred to the BTM candidate via manuals, training guides such as the PQS, and discussions with qualified personnel, particularly when discussing items on the PQS. Also, experience and knowledge is

gained when conducting boardings under the tutelage of qualified personnel and from feedback provided during the pre-board and qualification board. Certification signifies that the member has met the minimum standards to conduct boardings as a qualified BTM. More learning takes place as the member conducts more boardings in the CN environment and by re-certifying every six months.

b. Boarding Officer

A boarding officer is a Coast Guard Officer, Warrant Officer, Chief Petty Officer, or Petty Officer who has the legal authority to enforce U. S. rules and regulations derived from United States Code Title 14, Section 89. The qualification process and requirements to become a boarding officer are more stringent than that of a boarding
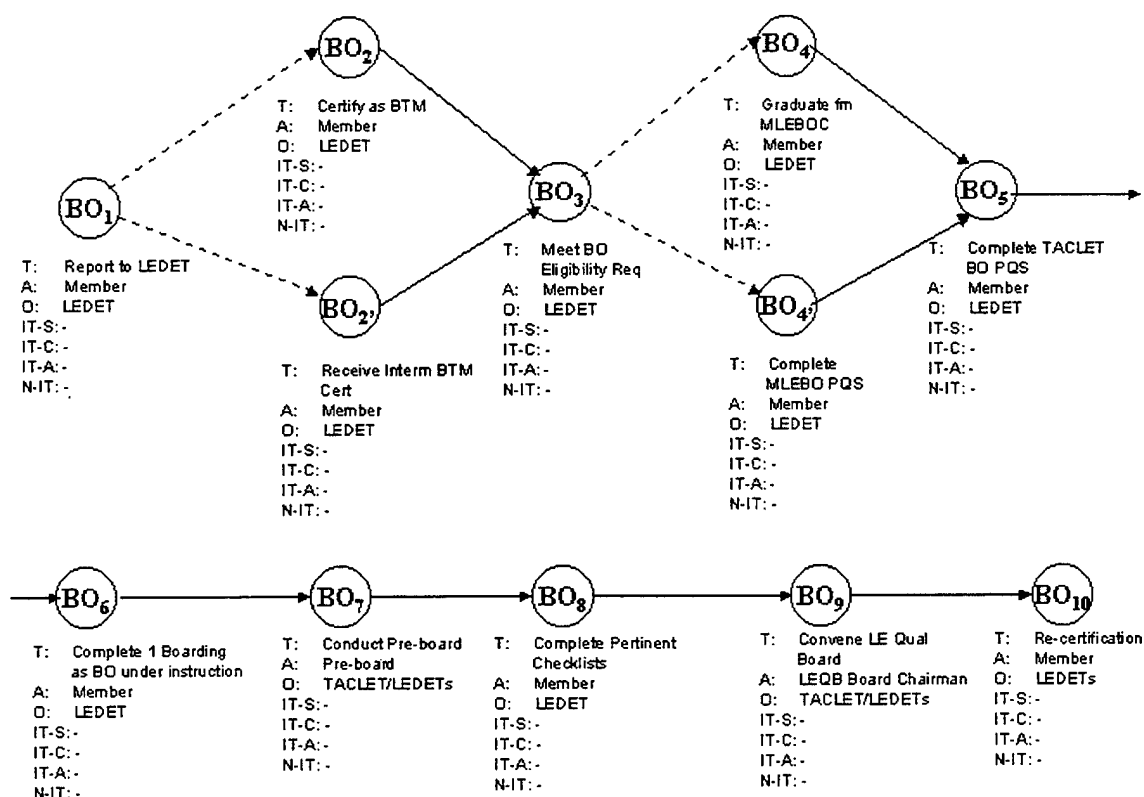
Figure 3.7 – Boarding Officer Qualification Vertical-flow Process

team member because of the legal responsibility and authority a person designated as a boarding officer has. **Figure 3.7** outlines the boarding officer qualification process that will be discussed.

At this point, the member must complete at least one CN boarding under a qualified boarding officer's instruction. A pre-board is then conducted and prior to requesting that a LEQB convenes, the member must ensure that he has completed all required checklist including the Boarding Officer Qualification Checklist. The Boarding Officer LEQB consists of the Operations Officer (or the Senior Inport OIC) as the board chairman, an Officer certified as an OIC, a certified Officer in Charge, and a certified Boarding Officer. Upon certification, the member must re-certify every six months in order to remain eligible to perform duties as a boarding officer.

The Boarding Officer qualification process is sequential based on the KOPeR parallelism measurement of 1.20. IT is not used throughout the process in any capacity. The process allows explicit knowledge transfer through publications such as the Coast Guard Maritime Law Enforcement Manual, the Boarding Officer PQS, a manual known as the Boarding Officer Job Aid Kit (BOJAK), that provides the BO with the rules and regulations that apply to U. S. vessels, and other memorandums, publications, or messages that pertain to the CN deployment process. Tacit knowledge transfer occurs predominantly by performing boardings under the supervision of a certified BO, through feedback during the pre-board and certification board, and through experience gained during the time between qualification and re-certification.

c. Officer In Charge

All commissioned officers assigned to TACLET must be Officer In Charge qualified. An Officer In Charge is the designated leader of a LEDET and is charged with ensuring that his/her detachment maintains operational readiness and is responsible for all law enforcement decisions when conducting CN operations. The qualification process for an OIC also includes becoming certified as a boarding officer and completing the qualification process illustrated in Figure 3.8. A prospective OIC reporting to TACLET is normally a Lieutenant (junior grade) who has just completed a tour at an operational unit as a certified BO; however, this is not always the case. The process described below pertains to both scenarios.
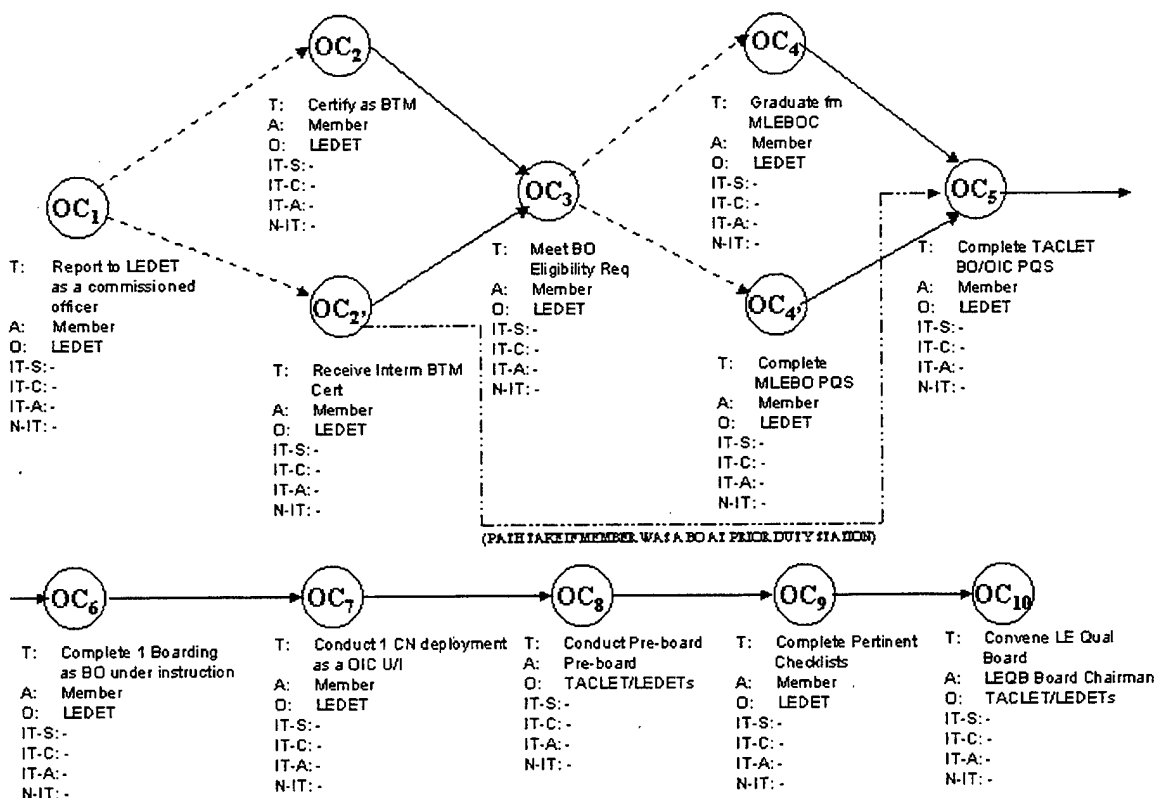
Figure 3.8 – Officer In Charge Qualification Vertical-flow Process

As mentioned earlier, the prospective OIC must certify as a BO as well as an OIC. This process begins with the member reporting to TACLET and obtaining an interim BTM certification or certifying as a BTM. If the member was not a certified BO at his/her prior duty station, the member must meet BO eligibility requirements and complete the MLEBOC or complete the tasks required in the BO PQS. Next, the TACLET BO/OIC PQS must be completed. During the perspective OIC's first CN deployment, he/she must conduct a CN boarding under the instruction of a certified BO and must perform the duties of an OIC during the deployment under the instruction of a qualified OIC. The member's first CN deployment under instruction with a qualified OIC is considered the "break-in" deployment where he/she learns the duties of an OIC during a CN deployment aboard a naval vessel.

Like the previously mentioned processes, the OIC qualification process is essentially sequential (parallelism value of 1.20) and does not employ IT to assist in completing the process. The prospective OIC obtains his/her knowledge via the same methods employed in the BO qualification process, as well as through OJT during the first break-in deployment with a qualified OIC.

d. LEDET Watchstander

Like the preceding qualification processes, this process is a sequential process (parallelism value of 1.25) that does not use IT. The LEDET watchstander acts as the law enforcement expert on board a naval vessel while at sea during a CN deployment. The member departs for his/her first deployment after reporting to TACLET. The OIC then assigns the member to stand watch with a qualified watchstander and at the same time is required to complete the TACLET watchstander

PQS. The OIC schedules a board when he/she feels that the member is ready to stand watch alone. The board consists of the OIC and other members of the LEDET. The qualification process is relatively simple, however, the ability to stand a vigilant watch is much more difficult relative to the process. The watchstander must be familiar with how operations are conducted on board a naval vessel so that he/she has the credibility to work with the naval vessel's watchstanders. Further, the LEDET watchstander is relied upon to provide guidance regarding any TOIs that are encountered and must possess enough judgment and presence of mind to make decisions that are representative of decisions the OIC would make. The OIC or Executive Petty Officer (XPO) is normally available at a moment's notice, however, there may be times when the senior LEDET personnel may not be in a position to make time sensitive decisions that the watchstander will have to make.
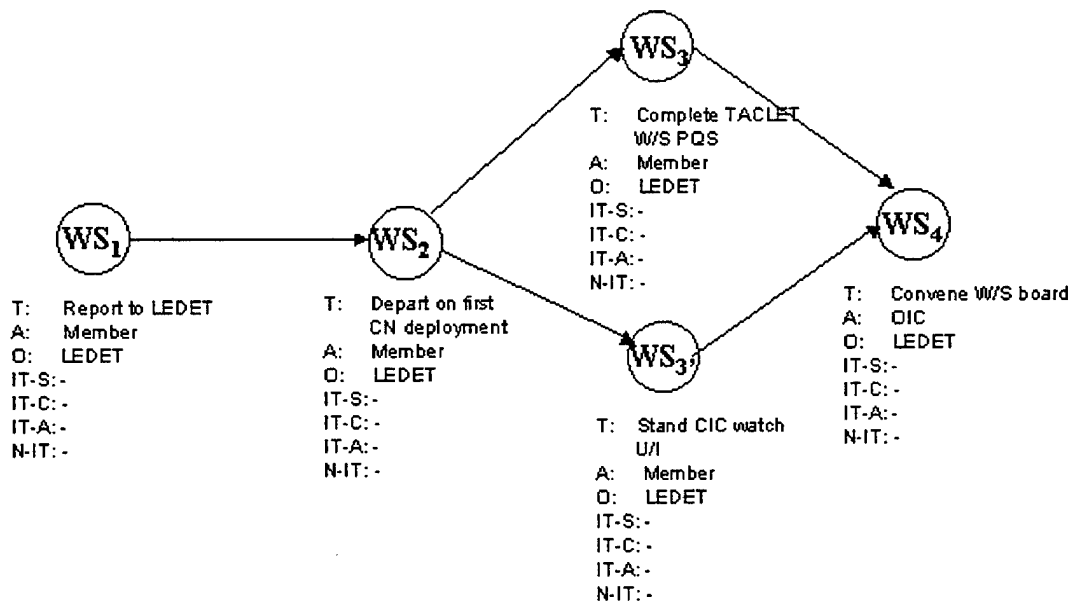
Figure 3.9 – LEDET Watchstander Qualification Vertical-flow Process

79

Watchstanders gain knowledge through experience not only by standing watch, but also performing other law enforcement duties such as BTM or BO. These qualifications allow a watchstander to understand what is important with regards to what type of information would be useful for a boarding team. By knowing this information, the watchstander can make steps to provide the boarding team all the data and information needed during the pre-boarding task in order to complete a successful boarding.

4.   Training Process

The training process is used to determine what formal training is available for TACLET personnel to attend and whom TACLET will send when it is available. Formal training, which TACLET personnel may attend include the Maritime Law Enforcement Boarding Officer School, Boarding Team Member School, flight crew training, and other law enforcement training offered by various law enforcement agencies and organizations. The primary agent responsible for the process to be carried out is the Training Officer (TO). The Training Officer is responsible for identifying what training TACLET requires to support its missions, determine where and when the training is scheduled, and obtain quotas for TACLET personnel to use.

The process begins with the training officer identifying the training needs of TACLET. In this case, the TO determines what the training needs are based on requirements set by Coast Guard policy, the CO, and the needs outlined by the XO and detachment OICs. Next, the TO will identify what training is available and when the training is available from several sources. The formal training required to support the

T1 → T2 → T3 → T4 → T5

T1	T2	T3	T4	T5
T: Identify training needs	T: ID available trng	T: Select Members	T: Approve Training	T: Inform Member
A: Training Officer (TO)	A: TO	A: Training Board	A: Commanding Officer	A: TO
O: Training Board	O: Training Board	O: TACLET/LEDET	O: TACLET	O: Training Board
IT-S: M/S Word	IT-S: -	IT-S: -	IT-S: Trng Tickler (Word)	IT-S: Trng Tickler
IT-C: -	IT-C: Email, FAX, Phone	IT-C: Email	IT-C: Email	IT-C: Email
IT-A: -	Military Messages	IT-A: -	IT-A: -	IT-A: -
N-IT: Training Board Mtg	IT-A: -	N-IT: Training Board Mtg	N-IT: Meeting w/TO	N-IT: Meeting w/mbr
	N-IT: COMDNOTE 1540			

→ T6 → T7

T6	T7
T: Mbr attends formal trng	T: Update Training Records
A: Member	A: TO
O: LEDET	O: Training Board
IT-S: -	IT-S: MS Word
IT-C: -	IT-C: Email
IT-A: -	IT-A: -
N-IT: -	N-IT: Training Files

Figure 3.10 – Training Vertical-flow Process

primary process described in this thesis requires the training officer to work within the Coast Guard organization. Meaning a standard process used by the entire Coast Guard exists to request that unit personnel attend formal training sponsored by a Coast Guard training facility. Next, the training board convenes to decide what personnel will be sent to what formal training and when.

The training board is responsible for coordinating formal training, identifying and prioritizing the unit's formal training needs, and choosing and scheduling what personnel will attend a specific formal training class. The training board consists of the TO, all OICs, and each LEDET's Executive Petty Officer (normally a chief petty officer).

A list of the training board's decisions is compiled and sent to the CO in memo form with a "tickler" attached for approval. The CO may or may not meet with the TO if he/she has questions or requires that changes be made. Once the CO approves the training tickler the TO informs the member that he/she will be attending training. The

Training Officer updates the member's training file (paper) when the member returns from training.

The training process is sequential (parallelism value of 1.00) and uses word processing software to support the process (IT-S value of .571) and email as the primary form of IT communication. However, the process does not use any type of automation and a majority of the decisions require that the training board coordinate schedules during meetings, which adds to the cycle time of the process. Furthermore, the current training officer maintains paper files and has developed a personal "system" that allows him to keep track of issues that pertain to unit training. The person who relieves the current training officer will have to learn the system that is currently in place. It may prove more difficult to learn and keep well organized since it is a paper-based system. Also, the handoffs fraction has a value of .571 indicating a high level of process friction that contributes to a slow cycle time.

5. On The Job Training and Mentoring Process

OJT and mentoring is an essential part of the qualification process and is implicitly required based on the tasks required for knowledge workers to successfully qualify as OICs, boarding officers, boarding team members, and watchstanders. This is because in order for a person to complete the tasks required by the designated personal qualification standards, the tasks must be performed for a person qualified to approve that the tasks was done properly. In most cases, thought not specified, the person attempting to become qualified for a particular duty performs the tasks for personnel who are members of his/her detachment. Since the detachment the person is assigned to has a vested interest in ensuring that he/she is well qualified to perform potentially dangerous

duties, this informal method encourages personnel to assist unqualified members to learn the intricacies of the CN deployments and their role as an OIC, BO, BTM, or watchstander.

However, this informal method may also result in detachment members rushing a person through the qualification process in order to increase the number of qualified personnel. This is why the pre-board and the LEQB are essential "quality checks" for the qualification process.

6.   Information Technology Support

The use of IT in the horizontal process and the vertical-flow processes are discussed in detail above. In general, the use of IT to aid in transferring knowledge across the PACAREA TACLET organization and between LEDETs is very limited. Redundancy occurs in situations such as the LEDET matrix, which causes numerous problems that relate to file-processing systems. For example, the method currently used by PACAREA TACLET leads to data duplication and separated and isolated data to name two. Further, the IT infrastructure is poor and support for IT services do not come from the TACLET staff. Instead, TACLET relies on an outside source (namely a Coast Guard organization not related to TACLET) to develop, install, and maintain the system currently in place.

G.   CONTEXT ANALYSIS

Unlike the majority of the Coast Guard's operational units, which perform multiple missions, the Coast Guard's Tactical Law Enforcement Teams are unique because they primarily perform only one mission, namely counternarcotics operations.

Although their responsibilities have increased over the years, CN operations remain a LEDET's "bread and butter," and furthermore, the new operational responsibilities require the skills and knowledge developed while conducting maritime law enforcement. The following discussion describes the current context that LEDETs perform the horizontal process and explains how the knowledge is used and in what types of environments.

1. Environment

The regional TACLETs and their corresponding LEDETs are major contributors to the Maritime Security strategic goal based on the Coast Guard's 1999 Strategic Plan. As mentioned earlier, the Coast Guard is the lead agency for maritime drug interdiction and is tasked by the National Drug Control Strategy (NDCS) to "...conduct flexible operations to detect, disrupt, deter, and seize illegal drugs in transit to the United States and at U. S. borders. The purpose of these operations is to pressure drug traffickers, increasing their risks and costs, and in the process also seize drugs in the transit zone" (Strategic Plan 1999). The senior leadership of the Coast Guard has allocated an increased level of funding to support the achievement of this strategic goal. This is evidenced by PACAREA TACLET's budget increase over the last few years. PACAREA TACLET's current Commanding Officer, LCDR Sabelico, has stated that the budget has increased to approximately $1 million since he took command of the unit. Also, the addition of the deployable pursuit boat mission along with the increased number of personnel assigned to support the new responsibility points towards the dedication the Coast Guard's senior leadership has to meeting the goals outlined in the Strategic Plan.

PACAREA TACLET has benefited greatly by having the funds to purchase new equipment, having the opportunity to test new types of high technology "drug sniffing" devices to counter efforts by the smugglers to conceal the drugs, an increased amount of formal training opportunities, and an increase in the manpower allocated to the unit. All of these improvements are needed elements to allow the LEDETs to successfully accomplish the primary process goal. Especially since smugglers are becoming more and more sophisticated and are aware of the techniques used by LEDETs to detect drugs aboard seagoing vessels.

2.   Task Requirements

The basic processes required for the horizontal process to be performed consistently over time by other LEDETs and for knowledge to flow effectively were outlined above and described as the vertical-flow processes. These processes have been analyzed and show that they may support the knowledge flow throughout the PACAREA TACLET organization with regards to achieving the primary process goal and meeting all critical success factors. Each of the described vertical-flow processes contributes to the knowledge required for the CN deployment process to be successful. For example, the knowledge required to conduct a boarding requires that the boarding officer knows what the standard boarding procedures are. This knowledge is acquired from the formal training via the *Training Vertical-flow Process.*

3.   Organization Structure

The organizational structure is illustrated in **Figure 3.1** and shows that the hierarchy has four levels of management from TACLET's CO to the LEDET OIC. However, this does not accurately depict the relationship between the OIC and the CO

during a CN deployment. The OIC is normally hundreds, sometimes thousands, of miles away from the CO during a deployment and the two rarely have communications with each other regarding operational matters. When a LEDET is deployed aboard a naval vessel, the OIC is the maritime law enforcement expert and is legally responsible for any law enforcement action taken during a CN deployment. The OIC must take appropriate law enforcement action based on input from intelligence sources, recommendations by the naval vessel's CO regarding the safety of his/her crew and his/her operational responsibilities, and input from the JIATF and the corresponding Coast Guard district. It is clear to see the importance of having competent and highly knowledgeable OICs conducting these operations, particularly since the OICs are normally junior officers and must deal with personnel who are much more senior to themselves. Also, the OIC should have knowledgeable personnel assigned to his/her LEDET to use a source to draw recommendations from.

4. Organizational Memory

As with any bureaucratic organization, PACAREA TACLET maintains its memory using formal and informal means (Nissen et al 2000). Organizational memory captured using formal means includes manuals, policies, memorandums, databases, and other types of files, whereas, organizational memory is informally kept by "individuals and communities of practice" (Nissen et al 2000). Weick maintains that informal mechanisms capture richer and more important knowledge than through formal means (1995).

As described in detail earlier, LEDETs are guided by policies, procedures, and regulations that pertain to what knowledge LEDET personnel must be familiar with, how

the LEDET will carry out specific tasks during the CN deployment process, and in what way this knowledge will be acquired. However, the success of the primary process relies on the knowledge acquired via methods that the organization cannot fully codify (e.g., informal mechanisms). The current practice of transferring personnel annually results in "organizational deskilling" (Nissen et al 2000), particularly when transferred personnel are replaced with personnel who lack Coast Guard experience, much less maritime law enforcement experience.

This is a significant issue, because a person is scheduled to leave the unit at a point when he/she has gained the knowledge required to effectively assist a LEDET carry out the deployment process. For example, the Officer in Charge (OIC) rotation occurs more frequently than the enlisted rotation. This may slightly effect how a LEDET performs because the OIC normally carries out tasks that deal with interacting with other organizations, such as the CO of the USN ship, that the enlisted members of the team do not normally perform. The knowledge required to perform these types of tasks is very tacit in nature and requires experience in dealing with the politics involved when interacting with persons who are normally much higher ranking than anyone on the LEDET.

5. People

Each LEDET has an OIC, a Chief Petty Officer as the Executive Petty Officer, and seven other personnel ranging from First Class Petty Officers to Third Class Petty Officers. The OIC, XPO, and five other personnel are required to deploy on naval vessels for CN deployments. The two remaining personnel were designed into the LEDET structure as a contingency in the event someone has to remain behind due to

being injured, or they may be tasked to conduct operations that require only one or two personnel.

Enlisted personnel make up the majority of the personnel assigned to TACLET. The primary ratings (technical specialties) represented are boatswains' mates (specializes in seamanship) and machinery technicians (specializes in engineering). Other rates include quartermasters (navigation specialist), gunner's mates (weapons specialist), marine safety technicians, damage controlmen, and medical corpsman. Being assigned to a LEDET is considered an "out of rate" tour, which means that a person's primary duties do not involve work that requires their technical specialty. Everyone assigned to TACLET is expected to become a law enforcement expert. This is normally not unusual for personnel who are boatswains' mates, machinery technicians, gunners' mates, and even quartermasters, since most Coast Guard units require these personnel to qualify as a boarding officer or boarding team member. However, it may be unusual for personnel in the other ratings.

H.   INFLUX OF NEW PERSONNEL

As mentioned earlier, the addition of the TAGO-S mission resulted in an influx of new and inexperienced personnel to TACLET. This has not changed the horizontal and vertical processes discussed previously. However, it only intensifies the number of people involved in the current system. For instance, prior to the arrival of the new personnel, the *Assign Personnel to LEDET Process* was conducted, but this time for a much larger number of personnel. Since two seventeen-person teams were created, the two teams were created using personnel who had the required skill sets (e.g., small boat handling expertise). The remaining personnel were assigned to the LEDET program, but

they were redistributed in order to provide each LEDET with a relatively equal mix of experience to act as the core of each detachment. The new personnel were assigned to a LEDET. Since the majority of the incoming personnel did not have MLE experience, they were distributed based on their ratings.

Overall, the process has been slow, because the new personnel are very young and do not have Coast Guard experience of any kind. Not only are the "veterans" providing mentoring with regards to CN deployments, but they are also teaching the new personnel about life in the Coast Guard in general. Things such as pay issues, the advancement system, and Coast Guard culture are all being taught and learned. It is unknown what the results are in terms of missed opportunities for drug "busts" or intelligence gathering, however, every effort is being made to provide PACARE TACLET with the resources to provide the new personnel with the skills and knowledge to succeed.

THIS PAGE INTENTIALLY LEFT BLANK

IV. RECOMMENDED CHANGES

A. INTRODUCTION

The knowledge analysis conducted in Chapter III identifies three primary knowledge transfer methods used in the tasks critical to the achievement of each of the CSFs and the success of the CN deployment process (*Identify TOI, Pre-boarding, Boarding, Locate Narcotics, Seize & Arrest, and Take Custody* tasks). These knowledge transfer methods are on-the-job training, formal and informal training, and sharing of experiences such as debriefs, intelligence reports, and "water cooler" conversations.

The following sections describe recommendations based on the analysis conducted in Chapter III and focus on the CN Deployment process. These recommendations specifically address the identified horizontal process and do not directly provide solutions to other horizontal process that represent other operational areas or issues that must be analyzed in more detail. For example, there are recommendations that refer to the Coast Guard's personnel assignment process. Although the thesis touches on issues that must be addressed with regards to the assignment process, the overall impact will require a more in depth analysis from personnel management experts.

Innovating with knowledge management is a complex undertaking and requires experts from many fields of study and expertise. In the case of innovating the LEDET program, experts on Coast Guard personnel management, operations, information technology, as well as outside expertise in organizational behavior, knowledge management, and business re-engineering will be required to provide solutions that

consider all the variables involved in such an undertaking. In short, it is vital that all stakeholders are involved with the development of a comprehensive knowledge management system in order for the transformation to be useful to an organization.

B.   KNOWLEDGE ACQUISITION METHODS

On-the-job training, formal and informal training, and sharing experiences are vital knowledge acquisition methods used to gain the knowledge required to successfully achieve the CN Deployment process goal and are the predominant methods mentioned in Chapter III. The environment in which LEDET personnel perform their responsibilities is vastly different than that of knowledge workers who perform their duties in more traditional business and corporate organizations.   There is little room for errors in judgment when executing LEDET operations because the stakes are much too high. Specifically, the loss of life can occur if LEDET personnel do not have the appropriate knowledge and experience to perform a boarding. However, their civilian counterparts deal mainly with the loss of productivity and revenue and do not face the same type of consequences if they lack the knowledge and experience in their field of work. Therefore, it is important that LEDET personnel are exposed to the knowledge and experience required to achieve the horizontal process goal.

It has been said that experience is the greatest teacher. There is probably no better way to learn and gain the experience required for conducting a successful boarding than to perform boardings first hand. However, the current system requires a balancing act to be conducted between providing vital CN Deployment boarding experience to less seasoned personnel and placing the boarding team in a possibly life threatening situation.

92

A knowledge management system designed to tackle this issue should lower the amount of risk to the LEDET by immersing its personnel in environments that closely resemble real life experiences and augment this with other forms of knowledge transfer that allow the experiences of others to be shared across the organization. Combined, these methods will minimize the amount of exposure LEDETs will have to high-risk situations.

Both informal and formal training should be geared towards the development of skills and the acquisition of knowledge required to meet the system's CSFs as well as achieve the objectives. Informal training normally occurs once the member reports to TACLET, while formal training may or may not have been completed at the member's prior unit. The purpose of these types of training is to provide personnel with the minimum level of skills and knowledge required to perform specific duties. The aim should be to provide LEDET personnel with *additional* skills and knowledge when they report to PACAREA TACLET so that the likelihood of achieving the CN Deployment process goal is increased.

The sharing of experiences between people provides a valuable knowledge transfer medium because it allows people to expand their knowledge base by simply listening, reading, or seeing the experiences of others. For example, people who watch home improvement shows on television gain knowledge on how to perform "do-it-yourself" tasks around the house. Watching these shows can help a person learn how to install a water-heater or acquire the knowledge required to pave a driveway. LEDETs can benefit from sharing experiences with each other in much the same way. Particularly since today's technology can capture experiences in much more rich and meaningful ways. The advent of digital cameras, video teleconferencing, and virtual reality offers

unprecedented opportunities for a person to tell "sea-stories" and pass on their experiences to others.

C. IMPLEMENTATION OF IT TO ASSIST IN KNOWLEDGE ACQUISITION

The difference between a management information system and a knowledge management system lies in the purpose of each. A management information system tells "the decision maker *what had happened, but not why and what should be done,"* whereas, a knowledge management system is implemented to assist an organization in making decisions based on the experiences and knowledge of the organization (Thierauf 1999). IT enables the transfer and creation of both explicit and tacit knowledge across an organization in ways that allow knowledge workers the opportunity to acquire the knowledge needed to perform the tasks required to meet the horizontal process goal. For example, very large databases (VLDB) can be used to store documents, digital pictures, and videos that contain vital organizational experience that can provide solutions or help create knowledge that leads to possible solutions. Also, video teleconferencing (VTC) can be used to support the flow of knowledge between organizational personnel who are geographically dispersed. As mentioned earlier in this thesis, IT only *supports* a knowledge management system. More important issues such as business processes, organizational structure, and culture must be analyzed and possibly redesigned or reorganized prior to extensively implementing IT.

94

D. THE FRAMEWORK REQUIRED FOR A KMS

A usable knowledge management system requires an IT and organizational infrastructure that can support the transfer and creation of both tacit and explicit knowledge. The following list was taken from Thierauf and relates what the framework a knowledge management system should consist of (1999):

- The use of problem finding to get a handle on present and future problems as well as to identify future opportunities.

- A knowledge infrastructure that is related to very large databases, data warehouses, and data mining.

- Network computing that ties in with a company's intranets and extranets as well as the Internet.

- A wide range of appropriate software that is quantitatively and statistically oriented.

A successful knowledge management system employs these elements in some fashion. The first item pertains to an organization's ability to anticipate change in its environment and having the ability to adapt and take advantage of the situation to gain an advantage over its competition. In the case of the CN Deployment process and its identified vertical-flow processes, this relates to the ability of a LEDET to locate narcotics during a CN Deployment boarding and the capacity to identify new ways smugglers may choose to smuggle drugs into the U. S. An organization's ability to remain competitive results from an organizational culture and structure that allows for flexibility and an IT infrastructure implemented that allows for transfer knowledge across the organization.

The second element of a successful framework requires that the organization's knowledge management system have an infrastructure that can store and retrieve the vast amounts of data, information, and knowledge that will be collected over time. This includes the ability to provide the knowledge, or information to assist in creating knowledge, to knowledge workers in a form that is usable for a given situation or context. The framework requires that the system be created in an open systems environment. This means that the applications being used can be accessed across different systems (Thierauf 1999). This is particularly important to LEDETs because of their reliance on the use of intelligence databases maintained by other government agencies such as the El Paso Intelligence Center (EPIC), which is maintained by the Drug Enforcement Administration (DEA). Also, VLDB should be implemented in order to store data, information and knowledge that is required to perform data mining, provide quantitative and qualitative analysis, and trend analysis; all of which aid in knowledge creation and transfer.

Third, network computing allows an organization the capability to tap knowledge resources from parts of the organization that are geographically dispersed as well as allowing relatively easy interaction with other organizations. For example, the three regional TACLETs all perform the same mission. It would be wasteful to not share valuable experiences that the LEDETs from each TACLET have gained. Network computing allows for the transfer of knowledge across each of the TACLETs, as well as across the LEDETs that are assigned to PACAREA TACLET.

The final element required for a knowledge management system framework is the software required to collect, search, and disperse the data, information, and knowledge

required by the organization. This element will allow files to be accessed based on criteria specified by a LEDET in the same way search engines are used on the Internet.

E.   ORGANIZATIONAL STRUCTURE AND CULTURE

The current organizational structure of PACAREA TACLET is relatively flat, with regards to the execution of operational missions, despite the fact that a traditional hierarchical structure exists. The hierarchical structure is, in essence, a structure that exists for administrative purposes. However, when a LEDET deploys, the command structure becomes relatively flat, because tactical decision making gets pushed down to the LEDET level with little if any input from the TACLET staff.

The organizational structure allows for the LEDET to remain relatively flexible when performing CN deployments. Therefore, the following recommendations will pertain to how the implementation of IT will facilitate future changes to the Operations Officer's role. This paves the way for the function of the Operations Officer to change from a person who primarily performs scheduling to focus more on the operational readiness of the LEDETs in a strategic sense. The OICs will remain responsible for short to mid-term events, but the Operations Officer can become a knowledge/training/readiness officer who is in charge of ensuring that the implemented knowledge management system properly allows for knowledge to flow through PACAREA TACLET.

In this sense, the Operations Officer should still have an operational background, but he/she also must be an information technology manager, as well as having a familiarity with human resources and personnel management issues. This is vital when

taking into account proposals that will be discussed later. For example, one proposal calls for the creation of a maritime law enforcement professional designation. Here, the Operations Officer would be responsible for ensuring the integrity of such a program, because the program determines the operational readiness of TACLET and these professionals will be expected to transfer knowledge to other units within the Coast Guard.

The Coast Guard culture has historically been one that believed that it should "do more with less." However, this attitude has slowly been changing to one that accepts new ideas regarding how to conduct business in order to gain the most benefit from its people and equipment in terms of performance, as well as long-term costs. Meaning, the Coast Guard is realizing that the lowest bid is not necessarily the best bid. The innovative procurement process being used in the Coast Guard's Deepwater project illustrates this new attitude. The Deepwater project is using a procurement system that is based on life cycle costs vice lowest bid.

F. RE-ENGINEERING OF HORIZONTAL PROCESS

The current horizontal process can be dramatically improved by applying several technological solutions to specific tasks of the process that will shorten the cycle time and improve the possibility of successfully meeting the process goal and accomplishing each of the CSFs. The majority of these solutions require a mid to long-term commitment because of the technology required as well as the possible cost of employing such solutions. Other non-technological solutions also exist that can reduce the amount of process friction and possibly lower the cycle time of the horizontal process. The

following discussion presents the solutions in a way that outlines a possible migration plan for implementing the solutions over time.

1. Short-term Solution

A short-term solution that immediately impacts the *AAR Task* is the development of a TACLET network (via the Internet or Coast Guard Intranet) that allows all LEDETs the capability of accessing a database containing deployment summaries, lessons learned, digital pictures, schematic diagrams, intelligence information, and other pertinent artifacts. This solution also has knowledge transfer implications related to the *Deployment Summary/Deployment Debrief* vertical-flow process. Currently, PACAREA TACLET has an "in-house" developed database residing on a standalone computer, which contains some information and knowledge. But, this database can be improved so that it is easily accessible via a network by other TACLETs and provides more meaningful and rich knowledge. A Web based solution provides the best opportunity to have the system described above operational in a relatively short period of time.

This obviously has security implications and it may be more difficult to use such a solution with classified information. However, short of placing classified material on the database, it can provide LEDETs with a useful tool to access knowledge and experience gained from other LEDET personnel.

Designing and implementing such a system requires that the users, namely the LEDETs and other Coast Guard law enforcement personnel, provide input to a diverse design team. Later, this thesis discusses a sociotechnical methodology regarding how to design and implement technical systems. Once the system is in place, the TACLETs will require a dedicated IT expert to maintain such a system and provide training to personnel.

The goal would be to provide enough training to the LEDETs so that they have sufficient skills to input updates and effectively retrieve the appropriate information and knowledge, while the IT expert will provide the maintenance and any repairs the system requires. The current policy of using Microsoft products provides tools such as Internet Information Server that have the capability of implementing the type of system described above. However, numerous products are available that can provide the same type of functionalities and should be considered.

Inputs to the system should have value to the users. For example, lessons learned should provide personnel accessing a particular lesson with knowledge regarding the thought process and specific actions a LEDET went through to execute a certain mission or operation, such as a high profile boarding. Raw data does not facilitate knowledge transfer within LEDETs, although it is important when tracking particular statistics that provide data for many strategic issues. Therefore, it is important to provide documentation that will assist personnel to learn from the experiences of one another. This requires that personnel who use the system fully understand that, in order for a knowledge management system to be useful, the users must be willing to provide sufficient documentation that will allow an ample amount of knowledge to flow to other segments of the organization.

There are many ways to ensure that LEDET personnel and other users of the system provide the type of information and knowledge that will make this system successful. First, a knowledge librarian can be used to screen inputs for content and make certain that the inputs have the richness required for a significant level of knowledge transfer. Second, incentives can be used to motivate personnel to provide

input that can help other LEDETs who may face the same types of situations. For example, a periodic publication highlighting successful operations that used inputs to the knowledge management system can be published. This publication could provide real world cases that may not have been successful without the knowledge management system. Third, in the same sense, a reward can be given to the LEDET who has provided the most input to the system that has directly assisted other LEDETs in successfully completing an operation, as well as rewarding the LEDET who has used the knowledge management system with the most success. There are many more creative ways to promote the proper use of the system. However, the idea is, the Coast Guard must provide an environment that encourages the use of the system both in providing and in extracting knowledge.

Other useful inputs include videos of the boarding, particularly boardings that result in significant events such as a use of force situation or the discovery of a hidden compartment. The technology exists today to mount small digital cameras on each person so that the boarding can be recorded for future reference. For example, the FOX television show "Cops" provides police agencies around the country with a valuable training tool to assess their own policies and provide a virtual experience for police officers.

The next recommendation focuses on the process friction that occurs between the *Report to Ship, Detect and Monitor,* and *Identify TOI* tasks. Process friction is present because the agents involved in performing the tasks belong to two different organizations that have completely different cultures. Integration between the two organizations (Coast Guard LEDET and Navy crew) occurs in the form of the LEDET OIC acting as the

maritime law enforcement expert as well as the liaison. Also, the LEDET watchstander integrates the two organizations by representing law enforcement interests when working with the Navy watchstanders during the *Identify TOI* task. An OIC is normally a Lieutenant (junior grade), but the Navy's culture normally places less value in the experience of junior personnel than the Coast Guard. Therefore, in order to provide for better integration during a CN deployment, frocking an OIC to a full lieutenant during a CN deployment may demand more respect from Navy personnel and possibly reduce process friction

2. Mid-term Solution

A mid-term solution provides for the creation of a system that automates the administrative tasks required to complete the horizontal process. This system calls for the use of intelligent agents when the technology is practically available. Intelligent agents are used to bypass the "middle man" and to automate routine tasks normally done by human beings. Specifically, the following tasks are affected by this solution: *Assign LEDET, Pre-deployment Preparations, Depart Ship*.

The Operations Officer spends a lot of time creating and revising the LEDET deployment schedule because of the dynamic environment that requires the use of LEDET expertise. A system that handles LEDET scheduling based on the inputs from agencies requiring LEDETs would greatly reduce the amount of time the Operations Officer devotes to deployment scheduling. Every agency that requires the use of LEDETs would have access to the system and provide the system with inputs as to when and where the LEDET is required to operate. In this scenario, the system compares such inputs to the readiness status of the LEDETs, any constraints on deployments that the

102

TACLET Commanding Officer and his/her staff have determined (e.g., blocking out specific dates, length of deployments per LEDET, and type of operation). Then the system creates a balanced schedule based on all these inputs.

Once the agent creates a schedule, a string of events related to the deployment are initiated. For example, the LEDETs are informed of what deployments they are tasked to do, the weapons department is provided with information regarding what type of weapons are needed by whom and when, any message traffic that is required such as a country clearance message is automatically sent when they are required, and travel arrangements are made with the appropriate agency.

Since the deployment schedule can change at any time, the intelligent agent has the ability to provide any updates to all entities involved. This includes information on how the changes will affect what has already occurred in preparation for the original schedule. The agent can also initiate any administrative duties a LEDET departing a ship normally performs. For example, messages that are required will be sent and travel arrangements for a LEDET to return home will be made if they are necessary. Obviously, many tasks cannot be automated, such as cleaning weapons, but there is room for implementing IT in a way that benefits the process.

Improvements to tasks that directly relate to the achievement of the CSFs, namely the *ID TOI, Pre-boarding, Boarding, Locate Contraband, Seize & Arrest,* and *Take Custody* tasks are discussed later. These tasks provide a rich opportunity in regards to innovating with knowledge management through the vertical-flow tasks.

G. VERTICAL-FLOW PROCESS INNOVATION

Recommendations to innovate vertical-flow processes are similarly presented in a way that outlines a possible migration plan for implementing the solutions over time.

1. Short-term Solutions

Immediate changes to several of the vertical-flow processes can be implemented in order for knowledge transfer to improve. First, to shorten the cycle time required to assign personnel to each LEDET, the unit can employ software designed to assist in determining what mix of personnel can provide the best potential of meeting the horizontal process for all LEDETs assigned to PACAREA TACLET. For this software to work effectively, accurate documentation of the attributes of each person assigned (present and future) to PACAREA TACLET must be provided.

For example, a person's Coast Guard and law enforcement experience, career intentions, type of experience gained while at TACLET, and rank are all factors that should be considered by the software. An evaluation of each member may have to occur based on his/her law enforcement knowledge, physical abilities, general Coast Guard knowledge, and other factors determined to be important in order for the software to properly analyze the data and information and provide an optimal solution. The specifics of such attributes can be determined based on the sociotechnical design methodology discussed later in the chapter.

Second, knowledge transfer can be enhanced at the LEDET level by making additions to the deployment summary document format currently in use. The current format provides valuable statistics and Commanding Officer comments that often lead to policy changes and other high level initiatives. However, in most cases, it does not

provide sufficient documentation related to the knowledge required by a LEDET to learn from the experiences of another. A simple document highlighting important details of a deployment provide valuable insight as to how other LEDETs conduct business. Issues as germane as how to find transportation to a deployed navy vessel if it is being met in Aruba to something as complex as how an OIC can deal with the politics involved when conducting a dockside boarding on foreign soil. These are all valuable lessons that every LEDET should have access to.

This document should be augmented with debriefs conducted by the LEDET who performed the deployment. A "round table" discussion of what happened during a deployment provides a valuable medium for sharing experiences and knowledge. Ideas can be generated and can possibly prevent "re-inventing the wheel" over and over again. Also, these discussions can reveal the particular context certain actions were performed under. This is important because other personnel will be able to use these experiences as a baseline for decisions or actions that must be taken given certain situations that they may face in the future.

The Coast Guard currently is not using VTC on a regular basis, but the Internet and Coast Guard Intranet provide an excellent opportunity to distribute any lessons learned documents to share with deployed LEDETs as well as the other regional TACLETs. Also, creating a "LEDET community website," complete with chat, discussion forums, and unclassified documents, can help in transferring knowledge. The difficulty in creating this is having trained personnel to maintain it and designing a site that the LEDETs will use. Again, these issues can be addressed using a sociotechnical design methodology.

Discussions among LEDETs within PACAREA TACLET, as well as the other regional TACLETs, may or may not happen over night. An environment and culture must be created that rewards sharing knowledge and experience vice having an environment that explicitly or implicitly rewards individual knowledge or knowledge hoarded by one particular LEDET. Many corporate organizations provide monetary rewards for sharing knowledge, but this may not be an immediately feasible option in military organizations. One solution would be to raise the importance of team awards that recognize knowledge contributions to the organization and having this or any other "team based" awards (such as the Meritorious Unit Commendation) count towards promotions or other advancement related issues. Also, rewarding teams by giving more personal time whenever practical and assigning LEDETs to operations that are considered "bennies" (e.g., operations that are highly desirable because of its location or other unusual opportunities) are other ways to reward LEDETs that provide valuable inputs to the Unit's knowledge base.

2. Mid-term Solutions

Mid-term recommendations will require more in depth analysis and a greater investment in technology. The first mid-term recommendation recognizes it is increasingly important for personnel being assigned to a LEDET to have prior Coast Guard experience vice assigning personnel who have just completed basic training and "C" school ("C" school is specialized military training such as training to become a quartermaster). This is because the demands placed on LEDETs require that they are accustomed to deploying many months out of the year (many times deploying on short notice) and performing operations that are better executed if members have experience in

106

other Coast Guard missions. Furthermore, LEDETs normally operate independently from their TACLETs, performing operations that require small teams to interact with other federal agencies, officials from foreign nations, and senior military personnel. This requires a relatively higher maturity level from its members and more in depth knowledge regarding the Coast Guard that only traditional Coast Guard experience can provide.

For example, experience in conducting fisheries or recreational boating safety boardings allows for the development of a person's situational awareness as well as becoming familiar with how vessels are constructed. These types of experiences greatly enhance the possibility of the CSFs being met for the CN Deployment Process. Otherwise, the experience is gained when conducing CN deployment boardings, which can possibly sacrifice meeting the horizontal process goal.

The second mid-term recommendation is to establish a core of personnel who specialize in LEDET operations, in particular CN deployments. This does not necessarily mean creating a law enforcement rate. However, a definite career path should be in place in order to retain personnel who have LEDET experience. Currently, there is no specific designation a person can have that identifies him/her as having the training, experience, and qualifications obtained from serving on a LEDET other than looking at his/her service record and noticing that he/she was assigned to a LEDET. A process that allows personnel to earn a designation that identifies him/her as being assigned to a LEDET and performing specific duties and receiving specific training must be incorporated, both as an incentive to motivate personnel to enhance their professional background, as well as to facilitate a way to retain knowledge within the LEDET program. Also, as will be

discussed further, this can allow for the transfer of knowledge across the Coast Guard (not just with LEDETs) organization with regards to maritime law enforcement.

The current LEDET program structure allows for most rates (enlisted specialties) to be assigned to a LEDET as a junior enlisted and return at various points in their career. The same holds true for the officer corps. However, a more explicit process must be developed in order to maintain a solid foundation of personnel who have LEDET experience within the LEDET program. First, junior enlisted and junior officers are given the opportunity to screen for a billet within the LEDET program after initial operational tours at other Coast Guard units. The screening process should include a recommendation from prior commands, an evaluation of maritime law enforcement experience, and an interview process that includes being interviewed by personnel of the same rank or grade, as well as a well thought out physical fitness evaluation.

In this scenario, once accepted into the LEDET program, they are provided training determined to be required by LEDET personnel in order for them to perform their missions (this will be discussed in more detail later). During and after their initial tour in a LEDET, their subordinates, peers, and superiors evaluate their performance for their competence and value to the program. If the evaluation is positive, they are designated to be a Coast Guard maritime law enforcement expert and are assigned to perform duties at more traditional Coast Guard duty stations. After this tour, they have the option of returning to a LEDET if they received a favorable evaluation following their initial LEDET tour. Monetary incentives as well as the option to receive further training can be used to attract the most qualified personnel back to the program. For example, once a person is designated as a maritime law enforcement expert, then he/she will begin

receiving pay that recognizes his/her accomplishment. The pay should be permanent and should reflect the skills, training, and education this person has received and should be competitive with the pay received by other law enforcement personnel. Otherwise, the Coast Guard may risk losing these experts to other agencies, resulting in time, money, and effort wasted training and educating these personnel.

This process would continue throughout the course of his/her career and have several important results. First, personnel would return to the Coast Guard "fleet" and perform traditional Coast Guard missions, allowing them to maintain the skills they initially developed prior to serving on a LEDET, skills which are valuable to many LEDET missions. Second, knowledge transfer would be performed when LEDET personnel serve at traditional Coast Guard units. Since they were given more advanced training, they should be expected to pass that knowledge on to other members of the Coast Guard through unit training. Third, this process could further attract the best and brightest to the program and allow for the maintenance of a solid maritime law enforcement knowledge base for the TACLETs.

Maritime Law Enforcement knowledge is critical for the success of most operations performed by Coast Guard units. Personnel serving on a LEDET, coupled with their traditional Coast Guard experience, can provide these units with the training and skills to successfully transfer knowledge to other personnel at other Coast Guard units that they are assigned to. Obviously, this puts the onus on the regional TACLETs for developing their personnel in every aspect of maritime law enforcement, not just counternarcotics operations (e.g., recreational boating safety and fisheries).

The third mid-term recommendation relates to how the Coast Guard assigns personnel to TACLET and each of its LEDETs. The TACLET staff should not have to go through the current *Assignment of Personnel to LEDET* process every time new personnel are assigned to TACLET. The detailers should conduct the assignment of personnel to each LEDET with the assistance of IT. Furthermore, every member assigned to TACLET should have some type of Coast Guard experience as well as maritime law enforcement experience. This implies that an accurate and detailed profile of each member of the Coast Guard must stored in a database so that members can be properly assigned to each LEDET and the composition of the LEDET regarding general experience and skills are not changed after every transfer season.

In order for this to work, a decision regarding what the specific personnel make-up for each LEDET at PACAREA TACLET, and eventually every existing LEDET, must be determined. For example, it may be decided that a particular LEDET will have nine personnel consisting of an OIC with prior experience as a BO on board a major cutter, a boatswains' mate first class who has served two previous tours at a TACLET and has served as an XPO aboard a patrol boat or small boat station, a junior boatswains' mate in his/her second tour at a TACLET and a standard boat coxswain, two machinery technicians in their first or second tour at a TACLET with law enforcement experience obtained from other Coast Guard units, a gunners' mate recently stationed on board a cutter and possibly having previous TACLET experience, a damage controlman in his/her first tour at a TACLET, a health service technician, and finally a marine safety technician both on their second tour at a TACLET.

Once the creation of the personnel database has been completed, intelligent agents can be employed to do a majority of the work conducted by the detailer. For example, the intelligent agents can be used to find a person or a group of people whose profile matches the requirements for a person filling a specific billet within a LEDET. Next, the personnel identified who match the criteria can be put through a screening process that may include a physical fitness evaluation and an interview process.

Knowledge transfer and creation can depend on the synergy created by a group of people working together. Therefore, an interview process that involves the LEDET that may be receiving the new member should be conducted. This allows the LEDET to determine if the prospective member can provide the dynamics required for the team to be highly effective. Many successful organizations, including Volvo and Sherwin-Williams Paints, have employed this technique with a great degree of success and there is no reason to believe that it cannot work in the LEDET personnel assignment process.

The difficulty in implementing such a selection system lies in the Coast Guard's capability of having enough personnel to fill all the LEDET billets who have the right mix of Coast Guard experience, maritime law enforcement experience, career intentions, and other criteria and balancing that with having enough personnel to fill other traditional Coast Guard billets that also require the same type of expertise in one form or another.

H.   IT IN PACAREA TACLET'S KNOWLEDGE MANAGEMENT SYSTEM

Suggestions on the implementation of IT to support the knowledge management system designed to benefit the CN deployment process were mentioned above. This section describes other ways IT can be leveraged to acquire knowledge via the three primary knowledge acquisition methods discussed at the beginning of the chapter.

Figure 4.1 is a top-level view of the proposed IT infrastructure. The
infrastructure consist a central storage area of knowledge called the *Knowledge and
Learning Repository*. The repository is connected to geographically distant nodes via a
wide area network (WAN). The repository contains data, information, and knowledge
pertaining to CN Deployment operations. This includes deployment statistics, such as the
number of boardings conducted by a particular LEDET during a given time interval,
documents, such as after action reports, digital pictures of vessels, videos of boardings or
training lectures, and other types of intelligence information. The central repository also
has a search engine capable of providing users with accurate responses to requests made
of the repository. Other capabilities will include email, chat, Internet access, and word
processing to name a few.
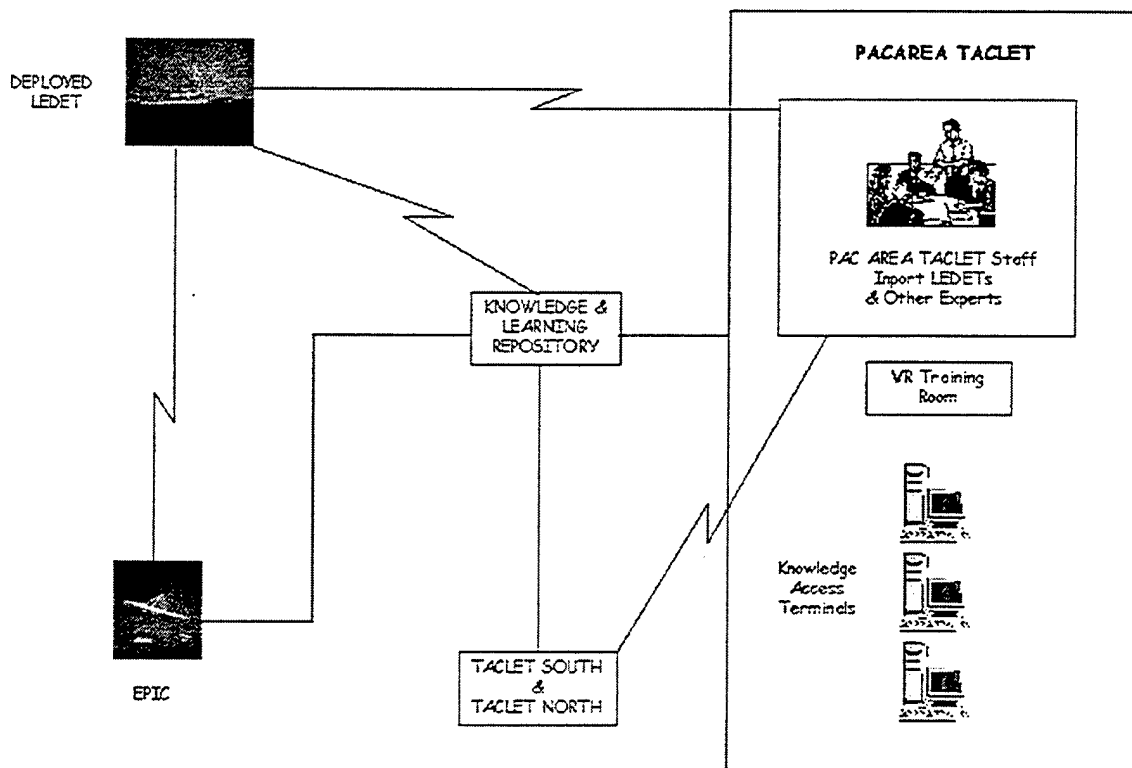
Figure 4.1 – Top Level View of Knowledge Management System

112

Access to the knowledge and learning repository is achieved primarily through the use of *knowledge access terminals*. These terminals are located within the network and can be accessed by deployed LEDETs via a wireless connection from sea. These terminals provide access to documents, digital pictures, and videos, which can be used for training or as tactical intelligence prior to a LEDET conducting a boarding if a vessel already has a record within the system. The knowledge repository is supplied intelligence information by external sources, such as LEIS II, and provides a "package" of knowledge to whoever is requesting knowledge regarding a vessel or crewmembers.

The Virtual Reality (VR) training node allows LEDETs to conduct training in a real world simulation. This is achieved by the node's ability to use neural networks to base training environments on actual boardings or other situations that have occurred in the past. Virtual reality coupled with neural network brings unprecedented capabilities to transfer and create knowledge. Also, it has the capability to provide LEDETs with experiences than can occur because neural networks have the capability to learn from the past, thereby envisioning creating boarding environments that may exist in the future. This ability allows LEDETs to prepare for future challenges that smugglers may present.

The final aspect built into the WAN is the ability to conduct video teleconferencing (VTC). This allows LEDETs from all three regional TACLETs to share experiences via "water-cooler" conversations. This method has been known to increase the level of knowledge transfer. An example includes the use of VTC in British Petroleum. Also, the ability to transmit real-time video adds another dimension to the system, namely, the ability to provide a LEDET with assistance from other CN Deployment experts when conducting difficult boardings. This is achieved by having

miniature cameras as part of each person's boarding equipment and having the images transmitted to PACAREA TACLET so that the boarding can be analyzed by personnel on shore. Obviously, there are cultural issues to contend with when implementing this type of system and will be discussed later.

I.   IT EFFECTS ON VERTICAL-FLOW PROCESSES

The new IT infrastructure will have direct effects on the following vertical-flow processes: *Deployment Summary/Deployment Debrief, Qualification, Training,* and *OJT/Mentoring.* Other effects may occur based on systems thinking, which was popularized by Senge (1990). Systems-thinking advocates that unplanned outcomes occur given any changes to an organization and an organization must be aware, as well as prepared, for these possible outcomes.

The IT infrastructure described above significantly impacts the current *Deployment Summary/Deployment Debrief* vertical-flow process by giving LEDETs richer and more meaningful experiences to obtain knowledge. The current process does little to transfer knowledge, particularly with regards to OJT, training, and sharing experiences. However, the recommended system provides limitless opportunities for knowledge acquisition. The current deployment summary document, which is drafted when a LEDET returns from a deployment, can be augmented with the capabilities this system provides. In particular, video capabilities add an unprecedented dimension to sharing a LEDET's deployment experience.

The debrief can be given to the TACLET staff, other PACAREA TACLET LEDETs, and LEDETs from the other regional TACLETs. This format allows the

deployed LEDET to share their experience and transfer knowledge to other personnel. In fact, this event can be seen as a regular training evolution. Any time a deployed LEDET performs a boarding of interest, they can provide training to other personnel immediately after the boarding process is complete, as well as provide a debrief to higher levels of the organization. This training format is beneficial, because the experience is fresh in the minds of the LEDET personnel and it provides other LEDETs with any lessons learned from the experience.

The boarding and the debrief can be viewed in the future since they are stored in the Knowledge and Learning Repository (KLR). It can be used to conduct training, particularly if there are specific issues that the boarding addresses, such as new techniques used by smugglers to create hidden compartments, any non-routine legal issues that arose during the boarding, and any procedures or policies rarely invoked, such as scenarios that involve foreign navies or coast guards participating in the boarding. In the same sense, the KLR provides a medium for knowledge acquisition to occur in the form of sharing experiences and the training process. It can be particularly helpful for providing unqualified personnel with knowledge on how CN Deployment operations are conducted.

The implementation of a virtual reality and neural network based training system is technically the most complex segment of the system. However, it is also the most enriching. LEDETs can decrease the time it takes to develop the trust and teamwork required to perform boardings. Furthermore, it can decrease the time it takes for individuals to qualify and obtain the knowledge required to perform CN Deployment tasks and it takes past LEDET experiences and provides possible scenarios that may

occur in the future. Finally, it provides experiences that would otherwise have to be experienced in real life situations, which may unnecessarily expose personnel to dangers that could be avoided.

The *OJT/Mentoring* process is a vital form of tacit knowledge transfer and augments other methods used to transfer explicit knowledge. A significant contribution this system provides is the ability to transmit real-time footage of a LEDET conducting a boarding. The video allows CN Deployment experts to discuss with less experienced LEDET personnel, who are not deployed, a boarding and provide immediate feedback. Also, the experts see and hear everything the boarding team does and can assist in analyzing different aspects of the boarding.

J.   IMPLEMENTATION RECOMMENDATIONS

The IT infrastructure, its possible uses, and the benefits described above are only a small portion of what is required to implement a successful knowledge management system. It is critical to remember that knowledge management consist of providing solutions that consider the organization and its culture, the processes required to achieve the organizations goals, and the technology required to support the system. The following discussion describes a method to consider when implementing IT to support a CN Deployment process knowledge management system. It is important to remember that implementing IT is a relatively easy task. The more difficult task is to develop or design an organization that welcomes knowledge transfer and creation, and is willing to accept cultural changes that a well-designed knowledge management system will bring.

Pasmore discusses using sociotechnical systems design (STS) to enhance organizational performance, meet the human needs of the workforce, and enhance organizational flexibility (1988). These are all results desired from a knowledge management system, while not directly labeling it knowledge management. STS stresses the importance of developing harmony between the technical system and the people that use the system. Otherwise, the system will falter at achieving the desired results. Sherwood suggests a model to increase the chances of developing a workable sociotechnical system (1988). The purpose is to avoid calamities such as the one that occurred in the early 1970's at the General Motors Corporation assembly plant in Lordstown, Ohio.

The Lordstown plant was touted as being the most technically advanced vehicle production plant in the world and promised to achieve unprecedented levels of productivity and quality. However, these lofty goals were never met because the engineers and plant designers neglected to consider the effects the plant's technical design would have on the people that worked there. A technically advanced knowledge management system developed for PACAREA TACLET may have the same fate if the system is designed without input from the future users of the system.

K. SOCIOTECHNICAL SYSTEM DESIGN FOR THE CN DEPLOYMENT PROCESS

Sherwood advocates creating a high-performance, high-commitment organization, which is achieved by linking "people and technology in ways that optimize both the potential of the technology and the contributions of the people" (1988). **Figure 4.2** is a variation of the model he provides to design such an organization. The model attempts to

ensure that the five elements he considers important to creating a successful organization are addressed. These are the people, the technology, the political process, the environment, and the links between the four previous elements.
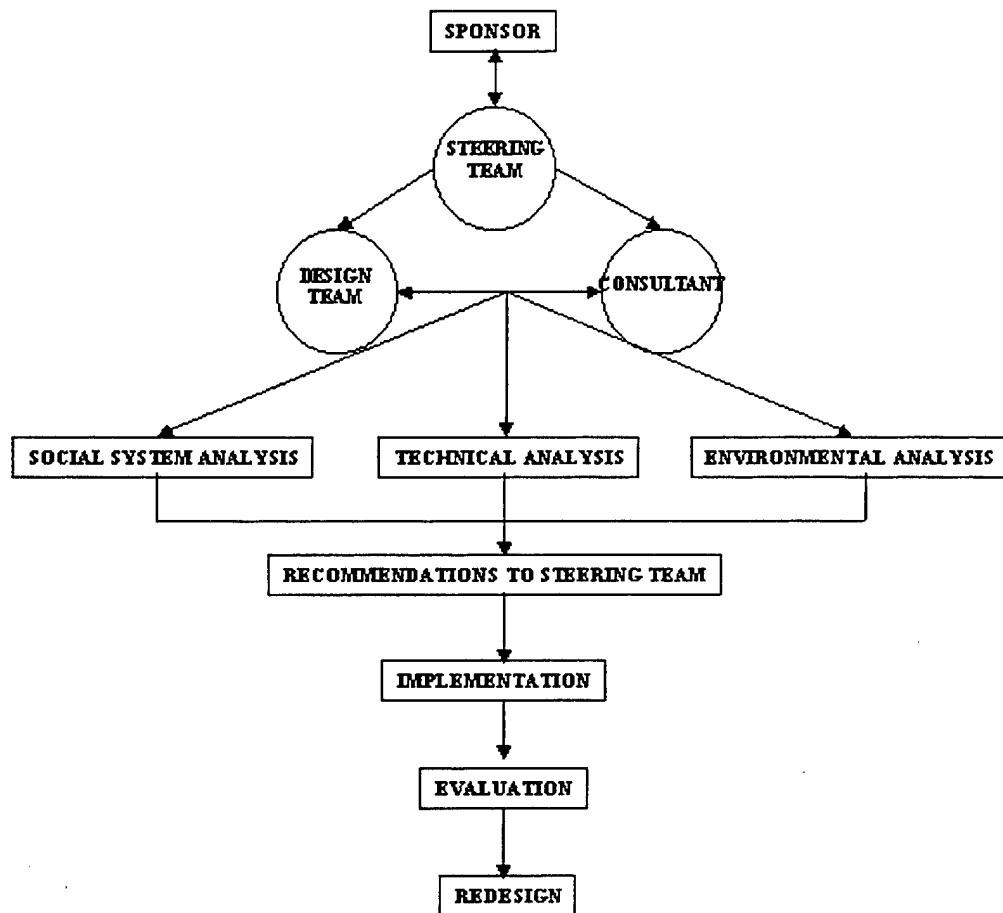
Figure 4.2 – Sociotechnical Design Model

Figure 4.3 categorizes these elements into the three corresponding knowledge management cornerstones (people, organization, and technology). The model can be adjusted to suit a particular organization's needs, but four functions are necessary to successfully achieve an effective system. They are "political and financial sponsorship, a sanctioning, legitimizing, and supporting role, design and implementation activities, and

118

educational inputs and challenges to the limits of the contemporary culture" (Sherwood 1988).

PEOPLE

-Culture
-Social System

TECHNOLOGY

-Means of performing duties

ORGANIZATION

-Political process
-Environment
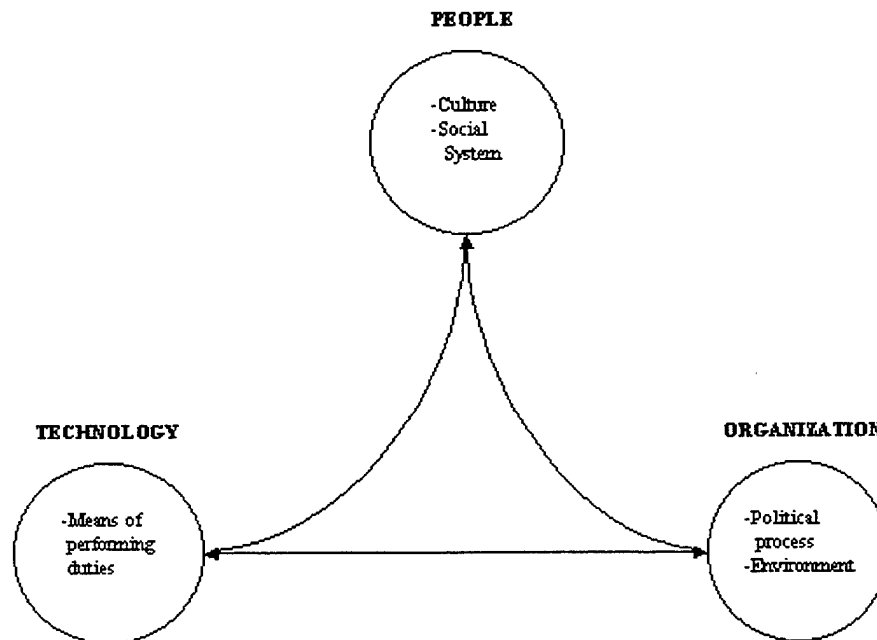
Figure 4.3 – Knowledge Management Areas of Focus

The sponsor will be a member of the steering team and should be a senior Coast Guard officer that has the authority and the political clout to oversee the implementation of PACAREA TACLET's knowledge management system. His/her responsibilities will include establishing a budget for the project, providing a cushion between the personnel involved in the project and the rest of the organization (e.g., PACAREA Commander and staff), ensuring that an environment conducive to risk taking is created, and the design team has the freedom to explore possibilities considered unorthodox to the current Coast Guard culture.

The steering team will consist of ten to twelve managers who are key stakeholders and do not regularly meet as a decision making body. For example, the steering team will not consist solely of the TACLET staff and the LEDET OICs. A more pragmatic make-up would consist of the sponsor, PACAREA TACLET's Commanding Officer, the Operations Officer, an OIC, the head of the design team, a representative from the Assistant Commandant for Operations office, a representative from the PACAREA Operations office, a representative from the Maritime Law Enforcement Boarding Officer Course, the CO's of the other regional TACLETs, a representative from the Assistant Commandant for Systems office, a representative from the Coast Guard's Chief Knowledge Officer's office, and a representative from the Telecommunications and Information Systems Command (TISCOM). Obviously this list of personnel can be changed to satisfy any stakeholders that are not represented.

The steering team is responsible for choosing the members of the design team, approving or modifying any recommendations made by the design team, and assisting the sponsor as being advocates for the initiatives being taken by the design team. The design team's success depends on the support it receives from the steering team. Therefore, it is critical that members of the steering team are fully supportive of the creation of a knowledge management system that will benefit LEDETs in executing the CN Deployment process.

The design team consists of members chosen by the steering team and has the responsibility of recommending the design for the knowledge management system. The team should include the targeted users of the system (e.g., LEDET OICs and personnel, Operations Officer, possibly command center controllers), at least one member of the

steering team, Coast Guard IT personnel, and contractors. I recommend the use of contractors to assist in designing the system because they bring a fresh perspective of current and up coming technologies, as well as technical expertise that may not be found within the ranks of the Coast Guard. However, it is important to have Coast Guard IT personnel because they strike the balance between understanding the LEDET mission and the understanding of high technology.

The design team will be responsible for the system development life cycle of the knowledge management system such as the logical and physical design and its implementation. They will also be responsible for developing a training program for users of the knowledge management system, maintaining communications with the steering team, and developing a transitional program that allows for the acceptance of the new system. It would also be wise to develop a training program focused on informing the steering team as well as the rest of the organization about the usefulness of knowledge management and what knowledge management actually is. This type of informative training attempts to put all personnel involved in the project "on the same page" with regards to what to expect from the knowledge management system.

The final player involved in the STS design of the knowledge management system is a consultant. The consultant may be taken from within the Coast Guard or contracted from a civilian organization. The consultant's responsibility is to challenge current mental models and assumptions maintained by "powerful members of the organization" (Sherwood 1988). Also, the consultant acts as a catalyst for encouraging fresh ideas and "out of the box" thinking and ensures that the design team strives toward achieving a system that will benefit the organization. A consultant for this knowledge

management system should have an understanding of the military culture, but also understand that there may be more effective ways to meet operational objectives via knowledge management, particularly with the use of information technology.

Again, there is no one method to develop a knowledge management system for the CN Deployment process. However, the above description of the people involved and their responsibilities should provide the necessary leadership, political leverage, and diversity to develop a system that takes into account the needs of the user and the technologies required to create a system that transfers and creates knowledge in a way that benefits the LEDETs.

IV. CONCLUSIONS AND FUTURE RESEARCH

A. CONCLUSIONS

The major contribution this thesis provides is the application of a "break through" knowledge management system design methodology to a knowledge intensive military work process. Specifically, the methodology was used to develop a knowledge management system (KMS) for the United States Coast Guard (USCG) Pacific Area Tactical Law Enforcement Team (PACAREA TACLET). The focus was on applying knowledge management innovation using the above mentioned methodology to the Law Enforcement Detachment (LEDET) Counternarcotic (CN) Deployment Process, which depends on the combined experience and expertise of all members of the detachment in order for the process to be completed successfully. This thesis provides evidence that this methodology, which was developed by Nissen, Sengupta, and Kamel, is robust enough to be used in civilian knowledge work processes, as well as military environments.

The purpose of the methodology is to attempt to allow an efficient flow of knowledge transfer at every level of the organization for the business processes that knowledge innovation is applied to. The aim of this is to have a consistent level of performance for a given business process when executed by different individuals or units of an organization. This methodology attempts to achieve this by taking advantage of knowledge management to enhance the effectiveness of key knowledge acquisition and transfer methods. In the case of the CN Deployment process, the three vital knowledge

123

acquisition and transfer methods identified: 1) were on-the-job training, 2) formal and informal training, and 3) the sharing of experiences.

The methodology begins by conducting an analysis of the primary or horizontal process. The analysis consists of methods used in business process re-engineering (BPR), as well as assistance from a measurement-driven inference re-design tool. This tool is known as the knowledge-based organizational process redesign (KOPeR) system and provides the capability of automating several redesign activities. Also, KOPeR provides recommendations regarding how to remedy pathologies present in a measured process.

The analysis found that the CN Deployment process is labor intensive and possesses a degree of process friction resulting from two distinct organizational interactions (Coast Guard and Navy) and the lack of information technology used in the process. Several recommendations were provided to improve the cycle time of the process. However, many of the tasks involved in the CN Deployment process cannot be automated because of the nature of performing counternarcotics operations. Also, this analysis performed individually provides little insight as to how knowledge is transferred within the TACLET organization. The following steps in the methodology provide the "break through" in the analysis and design of a knowledge management system because they address the issue of knowledge transfer within the organization.

The horizontal process goal and its corresponding critical success factors (CSFs) are determined after it is analyzed based on interviews with LEDET personnel (including the Commanding Officer and LEDET Officers in Charge), the Coast Guard strategic

goals, personal experience, and other types of documentation. The CSFs are used as a benchmark to determine what knowledge is required for each node in the horizontal process. This translates to the knowledge required to meet the horizontal process goal. In this case the goal of the CN Deployment process is to *identify vessels attempting to smuggle illegal drugs into the United States and locate where on the vessel drugs are being hidden.*

Next, the processes, which could have an effect on knowledge transfer, also called vertical-flow processes, are identified based on the knowledge required to meet the CSFs. The six processes identified for the CN Deployment process are: 1) *assigning personnel to LEDET process,* 2) *deployment summary/deployment debrief process,* 3) *qualification process,* 4) *training process,* 5) *on-the-job training/mentoring process,* and 6) *IT support.*

Lastly, a context analysis is conducted iteratively with the knowledge analysis to determine what knowledge is required given a certain situation. This involves identifying the environment that the LEDETs perform their operations under, understanding the culture and organizational norms of the Coast Guard, determining the extent of the technology used by LEDETs when they conduct CN deployments, and other issues that effect LEDETs performing their mission. Results of this contextual analysis are then used to identify key information technologies and other managerial interventions that offer a good potential to improve knowledge transfer.

Based on the results of this analysis, we can conclude that the LEDETs are receiving top-level management support, along with financial support, to successfully achieve the CN Deployment process. However, the organizational culture may not be

conducive to knowledge transfer because of supporting processes such as the annual transfer of personnel each year. In this case, organizational memory is lost once a person leaves the unit. Once an individual leaves a unit, his/her expertise and experience is gone from TACLET forever, unless he/she returns.

B. RECOMMENDATIONS

Based on the conclusions above, recommendations regarding how to improve knowledge transfer between the LEDETs assigned to PACAREA TACLET are provided in a manner that also provides a migration strategy to implement these recommendations. The recommendations entail reengineering several of the vertical-flow processes and applying information technology to assist in knowledge transfer between the LEDETs.

Possibly the most promising recommendation, as far as knowledge management is concerned, and the most difficult to implement is the development of a core of professionals who are experts in maritime law enforcement. This includes expertise in aspects other than counternarcotics operations, such as regional fisheries and recreational boating safety. The thesis provides a guideline that charts the career progression of a maritime law enforcement expert (both officer and enlisted) and allows for the development of an individual professionally, as well as the ability for knowledge to be transferred across the TACLETs *and* the Coast Guard.

Other recommendations support the above recommendation by implementing policies, procedures, and technologies that enhance knowledge transfer. For example, a system that accurately tracks the experience of each individual and assists detailers in properly assigning personnel is recommended. A more long-term recommendation

126

includes the use of intelligent agents to make the personnel assignment process more effective. Furthermore, changes to the Coast Guard's culture (e.g., lack of law enforcement specialty) that may enhance knowledge transfer and sharing are provided along with other technologies (e.g., WAN infrastructure) that will assist LEDETs in achieving the horizontal process goal.

There are numerous technologies available to implement a fully operational knowledge management system. The Coast Guard must develop a WAN capable of handling video teleconferencing, video, and other large files in order for the system to realize its full potential. Technology exists today that makes these capabilities practically possible. More advanced features of the system (e.g., virtual reality) will take longer to develop for practical use in this system, but the infrastructure can be designed to be scalable so that the implementation of these technologies will be relatively easy.

The largest obstacle to implementing a highly effective knowledge management system is the Coast Guard's organization and its willingness to accept changes that are required to have a system that fully benefits the LEDETs. Many procedures, policies, and business processes can be affected by the implementation of a knowledge management system. Therefore, the Coast Guard must have an environment that can accept these changes. One method to increase the success of this project would be to use a sociotechnical technical design strategy.

C.   FUTURE RESEARCH

The methodology described above is robust enough to be applied to other LEDET and general Coast Guard operational processes. Future work can be geared

towards other LEDET missions or other types of Coast Guard units such as patrol boats, larger cutters, and small boat stations. Any process whose success is dependent upon the expertise of knowledge workers can be innovated using the same methodology. As an example of its robustness, the same methodology is being used to innovate the carrier battle group "turnover" process in the Persian Gulf.

Also, areas that require more research include the reengineering of the Coast Guard personnel assignment process and the implementation of a program that creates a pool of maritime law enforcement experts as described in Chapter 4. Noticeably, the full implementation of a KMS for the CN Deployment process will have sweeping effects on other areas of the Coast Guard business processes. However, the changes made to other business processes will also be beneficial in the event that knowledge management innovation will be implemented in other operational processes.

Other organizational issues that must be resolved in order for a comprehensive knowledge management system to be implemented include the development of a reward system that encourages personnel to remain in the Coast Guard after receiving law enforcement training and developing a culture that rewards and encourages sharing knowledge. In particular, a culture that embraces the implementation and use of a knowledge management system that helps to transfer knowledge to others.

With this in mind, the physical design of the system must incorporate technologies that are scalable in the event that it is expanded beyond the LEDET realm. Researching the pros and cons of new technologies, such as XML and neural networks, and their effects on a knowledge management system is an important aspect of designing

a knowledge management system, as well as an enterprise information system, that will still be useful ten to fifteen years from now.

Further, research on providing high bandwidth capabilities to deployed LEDETs is an important aspect of the proposed knowledge management system. Particularly, if the Coast Guard wants to fully take advantage of experts who are not capable of deploying on a regular basis due to physical capabilities and the like.

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF REFERENCES

Borghoff, Uwe M., and Remo Pareschi. "Information Technology for Knowledge Management." Journal for Universal Computer Science vol 3, no. 8 (1997): 835-842.

Brooking, Annie. Corporate Memory: Strategies for Knowledge Management. London: International Thomson Business Press, 1999.

Corrall, Sheila. "Are We in the Knowledge Management Business?" URL http://www.rdg.ac.uk/libweb/

Davenport, Thomas, and Laurence Prusak. Working Knowledge. Boston: Harvard Business School Press, 1998.

Devlin, Keith. Infosense: Turning Information into Knowledge. New York: W.H. Freeman and Company, 1999.

Firestone, Joseph M. "Enterprise Knowledge Management Modeling and Distributed Knowledge Management Systems." January 3, 1999 URL http://www.dkms.com/EKMDKMS.html

Emery, F. & Trist, E. Analytical model for sociotechnical systems. In W. Pasmore & J. Sherwood, Sociotechnical systems: A sourcebook. San Diego, University associates, 1978.

Huang, K. T. "Capitalizing On Intellectual Assets." IBM: Systems Journal. Volume 37, No. 34 (1998): 1-18. URL http://www.research.ibm.com/journal/sj/374/huang.html

Liebowitz, Jay. "A Look Towards Valuating Knowledge Assets." Knowledge Management: A Competitive Asset. Ed. Special Libraries Association. Washington, DC: Special Libraries Association, 1998. 51-60.

Nissen, M. E. "Redesigning Reengineering through Measurement-Driven Inference," MIS Quarterly 22:4 (1998), pp. 509-534.

Nissen, M.E., Kamel, M.N. and Sengupta, K., "Integrated Analysis and Design of Knowledge Systems and Processes," Information Resources Management Journal 13:1 (January-March 2000), pp. 24-43.

Nonaka, Ikujiro and Hirotaka Takeuchi. The Knowledge-Creating Company. New York: Oxford University Press, 1995.

Pasmore, William A. Designing Effective Organizations: The Sociotechnical Systems Prospective. John Willey & Sons. New York: 1988.

131

Senge, Peter M. The Fifth Discipline: The Art and Practice of The Learning Organization. New York: Currency Doubleday, 1990.

Srikantaiah, Kanti and Michael Koenig. Knowledge Management for the Information Professional. Medford: Asis, 2000.

Takeuchi, Hirotaka. "Beyond Knowledge Management: Lessons From Japan." June 1998. URL http://www.sveiby.com.au/LessonsJapan.htm

Thierauf, Robert J. Knowledge Management Systems for Business. Westport: Quorum Books, 1999.

Zack, Michael H. "Managing Codified Knowledge." Sloan Management Review Summer 1999.

"Knowledge Management Systems." URL http://www.rst.navy.mil/rst/sailor21/knowledg.htm

United States Coast Guard Strategic Plan 1999.

INITIAL DISTRIBUTION LIST

1. Defense Technical Information Center 2
   8725 John J. Kingman Road, Suite 0944
   Ft. Belvoir, VA 22060-6218

2. Dudley Knox Library 2
   Naval Postgraduate School
   411 Dyer Road
   Monterey, CA 93943-5101

3. Chair, IS Academic Group (Code IS) 1
   Naval Postgraduate School
   Monterey, CA 93943-5103

4. Prof. Mark E. Nissen (Code SM/Ni) 1
   Naval Postgraduate School
   Monterey, CA 93943-5103

5. Prof. Kishore C. Sengupta (Code SM/Se) 1
   Naval Postgraduate School
   Monterey, CA 93943-5103

6. Prof Carl Jones (Code IS/Js) 1
   Naval Postgraduate School
   Monterey, CA 93943-5103

7. Commandant (G-CIT) 1
   2100 Second Street SW
   Washington, DC 20593-0001

8. Commandant (G-SRF) 1
   2100 Second Street SW
   Washington, DC 20593-0001

9. Commander, USCG Pacific Area 1
   Coast Guard Island Bldg 50-5
   Alameda, CA 94501-5100

10. Commanding Officer, Pacific Area Tactical Law Enforcement Team 1
    MCRD, 34000 Guadalcanal Avenue
    San Diego, CA 92140